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LEAGUE OF NATIONS

Health Organisation

**INTERGOVERNMENTAL CONFERENCE
OF FAR-EASTERN COUNTRIES
ON RURAL HYGIENE**

**Preparatory Papers relating to
BRITISH INDIA**



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

PROCEEDINGS.

Volume I. RECOMMENDATIONS on the Principles governing the Organisation of Medical Assistance, the Public Health Services and Sanitation in Rural Districts. (C.473.M.202.1931.III.) (Ser. L.O.N. P. 1931.III.11/I) 2/- \$0.50

Volume II. MINUTES. (C.473.M.202.1931.III.Vol.II.) (Ser. L.O.N. P. 1931.III.11/II) 6/- \$1.50

* * *

REPORT ON THE WORK OF THE CONFERENCES OF DIRECTORS OF SCHOOLS OF HYGIENE held in Paris, May 20th to 23rd, 1930, and in Dresden, July 14th to 17th, 1930, with a Memorandum on the Teaching of Hygiene in Various European Countries submitted to the Dresden Conference by Professor Carl Prausnitz and an Introduction by Professor Léon Bernard, Chairman of the Commission on Education in Hygiene and Preventive Medicine. (C.H.888.) (Ser. L.O.N. P. 1930.III.10) ... 5/- \$1.25

The following articles on Rural Hygiene will be found in the
QUARTERLY BULLETIN OF THE HEALTH ORGANISATION:

Volume II, No. 1 (Typhoid Fever in Rural Areas).

Volume III, No. 1 (The Best Methods of Treating Manure-heaps to prevent the Hatching of Flies).

Volume III, No. 2 (Fly-free Manure-heaps). (Fly Control in Denmark.)

Volume V, No. 2 (The Fly Problem in Rural Hygiene. A series of four articles.)

Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene

REPORT BY THE PREPARATORY COMMITTEE.

(C.H.1234.) (Ser. L.O.N. P. 1937.III.3) 2/6 \$0.60

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REPORT OF FRENCH INDO-CHINA. (C.H.1235.) (Ser. L.O.N. P. 1937. III. 4) 3/- \$0.75

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**INTERGOVERNMENTAL CONFERENCE
OF FAR-EASTERN COUNTRIES
ON RURAL HYGIENE**

**Preparatory Papers relating to
BRITISH INDIA**

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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 National Report for India containing :

1. A Note on the Public Health and Medical Services of the Central Government.
 2. Several Notes on Activities or Problems concerning the Whole of India.
 3. Notes of the Heads of Medical Services and Public Health Departments of Different Provinces and of the States of Dhenkanal, Hyderabad and Mysore.
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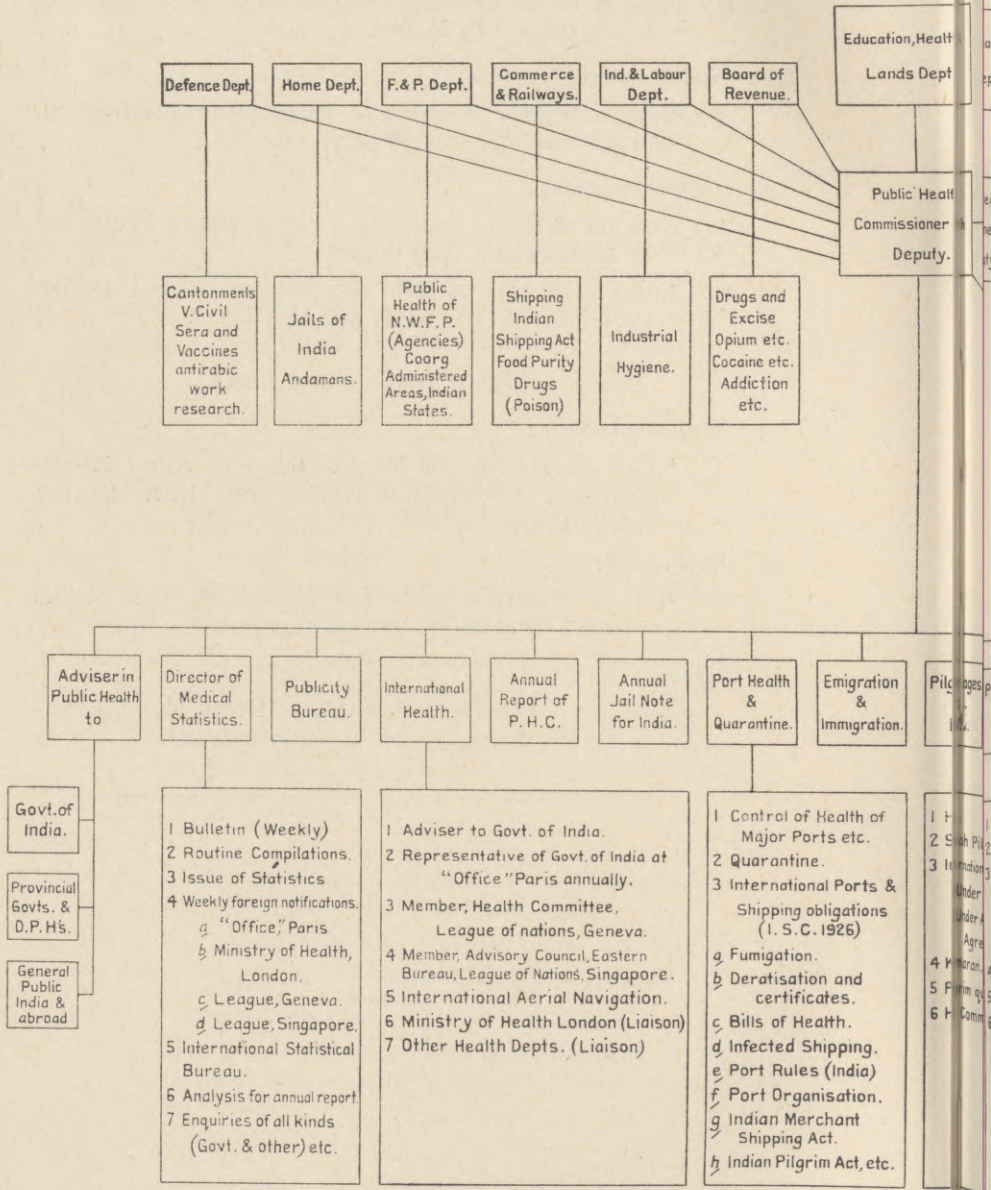
CONTENTS.

	Page
1. A Note on the Central Government's Health Organisation and Associated Institutions and Organisations concerned with Public Health, by Colonel A. J. H. RUSSELL . . .	9
<i>Appendix I.</i> — Returns received by and issued from the Office of the Public Health Commissioner with the Government of India	37
<i>Appendix II.</i> — List of Acts in force in Different Provinces in British India dealing wholly or in part with Public Health	38
<i>Appendix III.</i> — Health Bulletin Series	41
<i>Appendix IV.</i> — Note on the School of Tropical Medicine, Calcutta, by Colonel R. N. CHOPRA	43
2. Nutrition in India, by Dr. W. R. AYKROYD	45
3. A Note on the Method used to combat Rural Malaria in India, by Lieut.-Colonel G. COVELL	70
4. Rural Plague in India, by Colonel J. TAYLOR	81
5. Hookworm Infection in India	92
6. Tuberculosis in Rural Areas :	
A. Note by Dr. A. C. UKIL	98
B. Note by Dr. A. R. MEHTA	102
7. Leprosy and Anti-leprosy Work in India, by Dr. J. LOWE	103
8. Drug Addiction in India, by Colonel R. N. CHOPRA	114
9. Indian Red Cross Society, by Miss Norah HILL	120
10. Maternity and Child Welfare Bureau, Indian Red Cross Society, by Dr. Jeane ORKNEY.	123
11. St. John Ambulance Association, by Miss Norah HILL . . .	127
<i>Provincial Reports.</i>	
12. <i>Assam :</i>	
Note on Medical and Health Organisation in the Province of Assam, by Colonel C. E. PALMER and Lieut.-Colonel T. D. MURISON	131

	Page
13. <i>Bengal :</i>	
A. Note on Medical Services in Bengal, by Lieut.-Colonel T. C. BOYD	141
B. Note on Public Health Organisation in Bengal, by Lieut.-Colonel A. C. CHATTERJI	151
C. Note by the Director of Public Instruction, Bengal	168
D. Note on Working of Co-operative Societies connected with Rural Uplift in Bengal, by the Registrar of Co-operative Societies, Bengal	169
14. <i>Bihar :</i>	
A. Note on Medical Organisation in the Province of Bihar, by Colonel P. S. MILLS	174
B. Note on Public Health Organisation in Bihar and Orissa, by Lieut.-Colonel J. A. S. PHILLIPS	177
15. <i>Bombay :</i>	
A. Note on Medical Organisation in the Bombay Presidency, by Major-General E. W. C. BRADFIELD	206
B. Note on Public Health Organisation in the Bombay Presidency, by Lieut.-Colonel A. Y. DABHOLKAR. . .	216
16. <i>Central Provinces and Berar :</i>	
A. Note on Medical Organisation in the Central Provinces and Berar, by Colonel N. M. WILSON	230
B. Note on Public Health Organisation in the Central Provinces, by Major S. N. MAKAND	237
17. <i>Delhi :</i>	
Note on the Health Organisation in the Rural Area of Delhi Province, by Major W. H. CRICHTON . . .	251
18. <i>Madras :</i>	
A. Note on Medical Services in the Madras Presidency, by Major-General Sir F. P. CONNOR	261
B. Note on Public Health Administration in Madras Presidency, by Lieut.-Colonel C. M. GANAPATHY . .	266
19. <i>North-West Frontier Province :</i>	
Note on Public Health and Medical Services in the North-West Frontier Province, by Lieut.-Colonel W. E. R. DIMOND	297
20. <i>Orissa :</i>	
Note on Medical and Public Health Organisation in Orissa, by Lieut.-Colonel G. VERGHESE	303

	Page
21. <i>Punjab :</i>	
A. Note on Medical Organisation in the Punjab, by Colonel C. H. REINHOLD	318
B. Note on Public Health Organisation in the Punjab, by Lieut.-Colonel C. M. NICOL	326
22. <i>Sind :</i>	
Note on Public Health and Medical Services in Sind, by Lieut.-Colonel N. BRIGGS	349
23. <i>United Provinces :</i>	
A. Note on Medical Organisation in the United Provinces, by Colonel H. C. BUCKLEY	357
B. Note on Public Health Organisation in the United Provinces, by Dr. K. P. MATHUR	359
<i>Reports from Indian States.</i>	
24. <i>Dhenkanal State :</i>	
Notes on Health and Medical Services, Rural Recon- struction and Nutrition submitted by the Authorities of the State	382
25. <i>Hyderabad :</i>	
Note on Health and Medical Services in H.E.H. the Nizam's Dominions (Hyderabad State)	391
26. <i>Mysore :</i>	
Note on Medical and Public Health Organisation in Mysore State, by Dr. P. PARTHASARATHI	399

CHART OF CENTRAL PUBLIC HEALTH



INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

(Bandoeng (Java), August 3rd to 13th, 1937)

PREPARATORY PAPERS RELATING TO BRITISH INDIA.

I. A NOTE ON THE CENTRAL GOVERNMENT'S HEALTH ORGANISATION AND ASSOCIATED INSTITUTIONS AND ORGANISATIONS CONCERNED WITH PUBLIC HEALTH

by

Colonel A. J. H. RUSSELL, C.B.E., K.H.S., I.M.S., Public Health
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I. RELATIONS OF THE CENTRAL GOVERNMENT AND PROVINCIAL GOVERNMENTS IN RESPECT OF HEALTH AND MEDICAL SERVICES.

Under the Government of India Act, 1919, medical and public health administration were for the most part transferred to provincial governments. The following quotation from Schedule I, Part II, of the Devolution Rules under that Act indicates the position :



Provincial Subjects.

“ Medical administration including hospitals, dispensaries and asylums and provision for medical education, public health and sanitation and vital statistics, subject to legislation by the Indian Legislature in respect to infectious and contagious diseases to such

extent as may be declared by any Act of the Indian Legislature ; pilgrimages within India ; registration of births, deaths and marriages ; adulteration of foodstuffs and other articles subject to legislation by the Indian Legislature as regards import and export trade. Ports, except such as are classed as major ports. Regulation of medical and professional qualifications and standards subject to legislation by the Indian Legislature."

Central Subjects.

" External relations, including naturalisation and aliens and pilgrimages beyond the seas ; port quarantine and marine hospitals ; census and statistics ; legislation in regard to any provincial subject, in so far as such subject is, in Part II of Schedule I, stated to be subject to legislation by the Indian Legislature, and any powers relating to such subject reserved by legislation to the Governor-General in Council."

Under the new Constitution which, through the Government of India Act, 1935, has been brought into force from April 1st, 1937, the position in regard to medicine and public health has not materially changed. The 1935 Act has three lists of subjects for legislation : (1) a Federal Legislative List, (2) a Provincial Legislative List, and (3) a Concurrent Legislative List.

The Federal Legislature alone has power to make laws with respect to any matters included in the first of these. It includes the health of cantonments, central institutes for medical and public health research and technical training in these subjects ; the census ; emigration and immigration and presumably supervision over the health of emigrants and immigrants as well as the health conditions under which pilgrims proceed to places beyond India ; port quarantine, seamen's and marine hospitals and hospitals connected with port quarantine ; the declaration and delimitation of major ports and the constitution and powers of port authorities therein ; aircraft and air navigation and the regulation and organisation of air traffic and of aerodromes in regard to health and quarantine ; the carriage of passengers and goods both by sea and by air ; the regulation of conditions of labour and safety in mines and oilfields ; and migration within India from or into a Governor's province or a Chief Commissioner's province.

The Provincial Legislative List includes health conditions in prisons and allied institutions ; local government in relation to health, including sanitation, hospitalisation and registration

of births and deaths ; pilgrimages within India ; water supplies ; and the control of food and drugs, subject to certain restrictions.

The Concurrent List includes subjects in regard to which both the Federal Legislature and a Provincial Legislature have power to make laws. The list is in two parts. Part I includes the medical and health aspects of such questions as marriage ; the care of infants, minors and the mentally deficient ; poisons and dangerous drugs. In Part II are included important public health subjects, such as factories ; the welfare of labour ; the power of calling for statistics on any subjects ; and, notably the prevention of the extension from one unit to another of infectious and contagious diseases.

In regard to subjects in Part I, the federal entry is in effect confined to legislation, since the executive authority lies with the provinces. Central legislation on subjects in Part II may authorise the giving of directions to a province by the Central Government as to the carrying-out of such legislation.

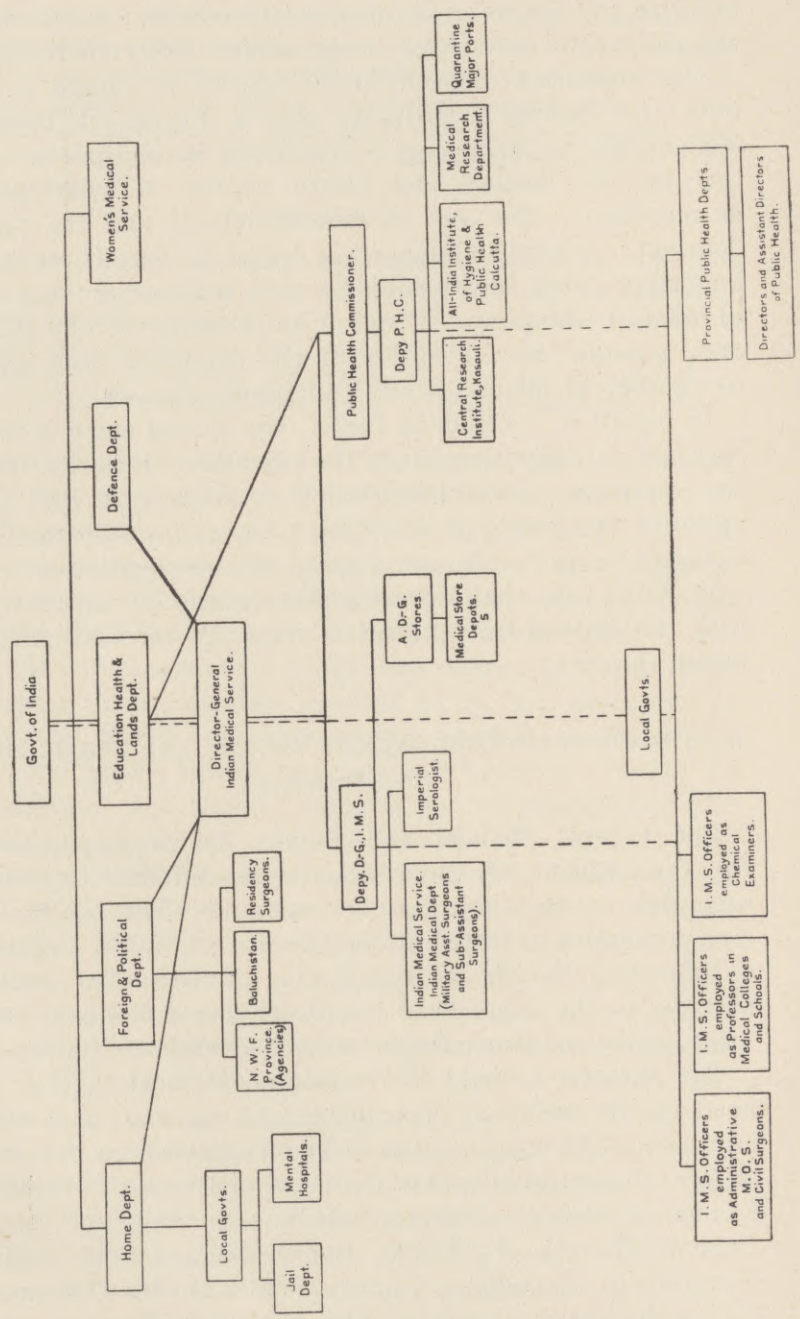
It will be seen that a considerable measure of control remains with the Federal Government in regard to medical and public health matters.

2. THE CENTRAL GOVERNMENT'S MEDICAL AND PUBLIC HEALTH DEPARTMENT.

The Central Medical and Public Health Department of the Government of India deals with different departments according to the subject under reference. The health of the civil population of British India is dealt with by the Department of Education, Health and Lands, that of the Indian States and agencies is the concern of the Foreign and Political Department, whilst the Home Department deals with the health of jails.

The Director-General of the Indian Medical Service is the head of the technical department and, on the civil side, is adviser to the Government of India on all questions of a medical nature. Technical officers in the Director-General's Department include a Deputy Director-General, an Assistant Director-General (Stores), the Public Health Commissioner with the Government of India, a Deputy Public Health Commissioner and a Medical Statistician. The department has no auxiliary

DIAGRAM SHOWING THE STATE CIVIL HEALTH ORGANISATION
IN BRITISH INDIA IN 1937.



staff, but has the usual secretarial staff of senior and junior clerks. (See the diagram on pages 8 and 9 and that on page 14.)

3. PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA.

The Public Health Commissioner with the Government of India is the adviser of the Government of India on all public health matters and corresponds direct with the departments concerned, but he also acts as staff officer for public health to the Director-General. He advises local governments and provincial Directors of Public Health when asked to do so and corresponds with the latter direct on technical subjects. On behalf of the Director-General, he is in administrative control of the Medical Research Department and is Secretary of the Scientific Advisory Board and of the Governing Body, Indian Research Fund Association. He serves on various committees, such as the Indian Red Cross Society, Indian Council of the British Empire Leprosy Relief Association, the King George Thanksgiving (Antituberculosis) Fund, the Maternity and Child Welfare Bureau, the Delhi Health School, all of which are directly or indirectly concerned with different aspects of public health work. He is also responsible to the Government of India (Department of Education, Health and Lands) for port quarantine, medical aspects of overseas pilgrim and emigration traffic and for international health matters. He prepares an annual report on the public health of India and a note on the health of prisons. Periodical reports are also issued to the Office international d'Hygiene publique in Paris and to the Health Section, League of Nations, in Geneva.

The Public Health Commissioner has for years past been a member of the Health Committee of the League of Nations in Geneva and also a member of the Advisory Council of the League of Nations Eastern Bureau at Singapore. He attends as often as possible the meetings of the Office international in Paris as the delegate for India.

4. VITAL STATISTICS.

The methods of collection of vital statistics have undergone little change in recent years and the responsibility for recording

these statistics for rural areas still lies with the *chaukidar* or the *thana moharrar* or village headman. At the same time, certain provinces have now got a fairly complete cadre of district health officers, and in these areas, at least, more reliable records are now being obtained.

The following table gives chief vital statistics for British India for 1934:

	Number	Ratio per 1,000 of population
Births . . .	9,288,897	33.7
Deaths . . .	6,866,244	24.8
Infantile mortality .	1,734,516	187 (rate per 1,000 births)

A list of the returns received by and issued from the office of the Public Health Commissioner with the Government of India is attached (Appendix I).

5. CENTRAL ADVISORY HEALTH BOARD.

Section 135 of the Government of India Act permits the establishment of Inter-Provincial Councils, with such duties as investigation of subjects in which some or all provinces, or the Federation and one or more provinces, have a common interest. The order establishing such a council may make provision for participation in its work by representatives of Indian States.

The Government of India have recently constituted a Central Advisory Board of Health from April 1937. The aim of this Board is to ensure co-operation between the centre and the provinces and between province and province in matters of health which are of common concern. Through standing or *ad hoc* committees, the Board will act as a central information bureau; it will advise on all matters referred to it by the central or by provincial governments and will make suggestions to the Government on any matters affecting public health in India to which the Board considers that the Government's attention should be drawn. The Board is so designed as to be representative of the whole of the Indian Federation, including Indian States. The Public Health Commissioner with the Government of India is Secretary of the Board.

6. THE MEDICAL RESEARCH DEPARTMENT.

This department of the Central Government is open to both Indian Medical Service officers and non-I.M.S. medical men. The cadre consists of thirty posts, thirteen of which are specified and seventeen non-specified, although four of the latter are at present in abeyance. Of the twenty-six appointments now available, not less than eighteen are reserved for I.M.S. officers, the remainder being open. The thirteen specified appointments include the posts of Directors of the Central Research Institute ; Director of the Haffkine Institute, Bombay ; Director of the King Institute of Preventive Medicine, Madras ; Directors of the Pasteur Institutes at Kasauli, Coonoor, Shillong and Rangoon ; three Assistant Directors at the Central Research Institute, two Assistant Directors at Haffkine Institute ; and one at the King Institute, Madras. The only laboratory directly under the control of the Central Government is the Central Research Institute, Kasauli, the others being under provincial governments or Pasteur associations.

Officers holding unspecified posts are ordinarily attached to provincial institutes under the orders of the Government of India to act as understudies and to assist in the carrying out of researches financed by the I.R.F.A. The authority to make appointments to specified posts is vested in the Government of India, but provincial laboratory posts are filled in consultation with the local governments concerned. The department comes under the Director-General, I.M.S., but is administered for him by the Public Health Commissioner, who is also Secretary of the Governing Body, I.R.F.A.

7. THE CENTRAL RESEARCH INSTITUTE, KASAUJI.

This large institute is under the control of the Central Government and is directed by the senior officer of the Medical Research Department. The staff includes three Assistant Directors and one or more research officers engaged in different enquiries. A large number of medical research problems are constantly under investigation, some of these being usually assisted by grants from the I.R.F.A. The Director is also

Editor of the *Indian Journal of Medical Research* and in the Institute is housed the library of the I.R.F.A.

The serum and vaccine section of the Institute manufactures prophylactic vaccines, other than plague vaccine, for the whole of India. Large quantities of cholera and T.A.B. vaccines are prepared and issued annually and, in addition, antivenin or immunised serum against cobra and Daboia venom are prepared and issued all over India. In addition to the usual routine work of a large laboratory, the Institute prepares stock and special autogenous vaccines and high titre sera and carries out a great deal of serological work.

The table opposite gives details of the State Institutes of British India :

State Institutes, Research, Pasteur, Hygiene, Lymph Vaccine and Radium, in British India.

	Controlled by	Nature of work							
		Research	Vaccine manu- facture	Lymph vaccine	Serum manu- facture	Routine examina- tion	Teaching and propa- ganda	Pastour treat- ment	Other treat- ment
Central Research Institute, Kasauli	Government of India Board of Management	+	+	—	+	+	+	—	—
Pasteur Institute, Kasauli		+	+	—	—	—	—	+	+
All-India Institute of Hygiene and Public Health, Calcutta	Government of India. Governing body.	+	—	—	—	—	+	—	—
School of Tropical Medicine, Calcutta. . .		+	+	—	—	+	+	+	+
Haffkine Institute, Bombay.	Bombay Government.	+	+	—	—	+	+	+	+
Pasteur Institute, Coonoor	Madras Government.	+	+	—	—	+	—	+	+
K.E.VII M.P.I., Shillong	Assam Government.	+	+	—	—	+	—	+	+
Pasteur Institute, Burma	Burma Government.	+	+	—	—	+	—	+	+
K.I. of P.M., Guindy, Madras	Madras Government	+	+	+	—	+	+	—	—
Radium Institute, Ranchi	Board of Management.	—	—	—	—	+	—	—	+
Public Health Institute, Rangoon	Burma Government.	+	—	—	—	+	+	—	—
Hygiene Institute, Lucknow	U.P. Government.	+	—	—	—	+	+	—	—
Lymph Vaccine Depot or Institute:									
1. Bengal	} Respective local governments.	—	—	+	—	—	—	—	—
2. Bihar and Orissa (Namkum Ranchi) .		—	—	+	—	—	—	—	—
3. Assam (Shillong)		—	—	+	—	—	—	—	—
4. U.P. (Patwa Dangar)		—	—	+	—	—	—	—	—
5. Punjab (Lahore)		—	—	+	—	—	—	—	—
6. Bombay (Belgaum)		—	—	+	—	—	—	—	—
7. Burma (Meiktila)		—	—	+	—	—	—	—	—
8. C.P. (Nagpur)		—	—	+	—	—	—	—	—

8. PASTEUR INSTITUTES.

There are now six Pasteur Institutes in India—at Kasauli, Coonoor, Bombay, Patna, Calcutta and Shillong. During recent years, it has been found possible to decentralise treatment by the issue of vaccine to local treatment centres. As a result, the numbers of cases attending at the institutes have largely decreased, and there is little doubt that this process of decentralisation of treatment will be extended further in the future. The Pasteur Institute, Kasauli, is administered by the Pasteur Institute Association of India and that at Coonoor is also managed by a local Pasteur Institute Association; the others are maintained by local governments.

Details of cases treated at Pasteur Institutes and anti-rabic centres in British India during 1934 will be found in the following table :

*Cases treated at Pasteur Institutes and Anti-rabic Centres
in British India in 1934.*

	Number of cases treated	Percentage of cases treated classified as		
		Successful	Failure	Death
Pasteur Institute, Kasauli	1,714	99.12	0.29	0.88
Out-centres	15,137	99.56	0.17	0.44
Pasteur Section, School of Tropical Medicine, Calcutta	1,134	99.74	0.18	0.26
Pasteur Section, Haffkine Institute Bombay.	1,830	99.78	0.16	0.22
Out-centres	5,806	99.55	0.26	0.45
Pasteur Institute, Coonoor	414	100.00	Nil	Nil
Out-centres	10,634	99.88	0.05	0.12
Pasteur Institute, Shillong, and out- centres	1,751	99.60	0.29	0.40
Pasteur Institute, Burma	1,701	99.65	0.24	0.35
Out-centres	373	99.46	0.27	0.54
Pasteur Institute, Patna	4,132	99.61	0.15	0.39
Out-centres	337	100.00	Nil	Nil
Grand total . .	44,963	99.65	0.16	0.35

9. INDIAN RESEARCH FUND ASSOCIATION.

The I.R.F.A., which was constituted in 1911 and which corresponds to some extent with the Medical Research Council in England, has for its object the prosecution of research into medical problems and experimental work generally in connection with the causation, mode of spread and prevention of disease.

The association depends primarily on funds provided by the Government of India. Its administrative control is vested in a Governing Body constituted by the Government of India and representative of both official and non-official opinion. The Honourable Member in charge of the Department of Education, Health and Lands is the President and the Public Health Commissioner with the Government of India is Honorary Secretary. The Governing Body is advised by a Scientific Advisory Board composed of technical medical experts.

The annual budget of the association, including administrative charges, has during past years varied between 7 and 12 lakhs of rupees (£50,000 to £90,000).

The results of the association's researches are published from time to time in the *Indian Journal of Medical Research*, the *Memoirs of the Indian Journal of Medical Research* and the *Records of the Malaria Survey of India*, all of which are issued under the authority of the association. These publications have now a firmly established position in the scientific world. In addition, non-technical articles, based on the results of research, are issued periodically for the benefit of the general public.

In order to ensure the closest co-operation between workers and to prevent overlapping of effort, an annual conference of medical research workers is convened under the auspices of the association. At this conference, free discussions are held on the work accomplished and on proposals for future work.

From a large number of research enquiries, specific mention may perhaps be made of the work now in progress on malaria, cholera, plague, kala-azar, maternal mortality and morbidity, which all take a heavy toll of life, especially in rural areas.

The results of the activities of the I.R.F.A. have without doubt been of the greatest value to the people of India—both

urban and rural. One need only recall the report of the Kala-Azar Commission and the nutrition researches of Sir Robert McCarrison to realise what has been achieved.

For years past, the association has maintained two organisations of outstanding benefit to the rural population of the country. These are the Malaria Survey of India and the Nutritional Research Laboratories; both may logically be regarded as branches of the Central Health Department, since the I.R.F.A. is largely dependent on the Central Government for financial support and the Public Health Commissioner is in administrative control of both.

10. THE MALARIA SURVEY OF INDIA.

The claims of malaria as a serious problem in India, particularly in rural areas, were recognised by the Government of India as early as 1858, when they undertook the important step of initiating cinchona cultivation for the production of quinine.

As regards the prevention of malaria, the formation of a central organisation several years prior to the war stimulated anti-malaria work generally throughout India. In addition, a number of provincial organisations were formed, each of these having its own malaria officer. At the suggestion of the Central Committee, special investigations were undertaken in representative parts of India, the Central Malaria Bureau was created at the Central Research Institute, Kasauli, and a journal was started under the title *Paludism*, which was the forerunner of the present *Indian Journal of Medical Research*. The Central Committee was later absorbed in the Scientific Advisory Board of the Indian Research Fund Association when that body was constituted. After the war, the need for a central malaria organisation became even more apparent, and in 1927, the existing Malaria Survey of India came into being. The Indian Research Fund Association has so far borne the entire cost of the Malaria Survey, whose budget now amounts to nearly 2 lakhs of rupees (£15,000) annually. The staff of the Malaria Survey comprises a Director and Assistant Director (both experienced malarialogists), a malaria engineer, an

entomologist, a biochemist, two medical assistants and a large subordinate staff. Its functions are :

- (1) To advise the Government on all issues relative to malaria in India ;
- (2) To initiate investigations on malaria ;
- (3) To undertake systematic research ; to organise knowledge on malarial problems and to arrange for making such knowledge available for practical application ;
- (4) To carry out epidemiological investigations ;
- (5) To advise upon and assist in carrying out anti-malaria measures ;
- (6) To undertake clinical work on malaria, including treatment ;
- (7) To train officers and others in practical malaria work ; and
- (8) To publish scientific results, bulletins, etc.

In addition to its headquarters at the Central Research Institute, Kasauli, a field experimental station is maintained, where continuous bionomical and epidemiological work is carried out. Here, also, a special course of training is given annually to medical and public health officers. These officers are drawn from all over British India and the Indian States, and the training provided has been of the greatest value to the general campaign against this disease.

II. QUININE.

Whilst provincial Public Health Departments annually distribute free, or at a low cost, considerable quantities of quinine and cinchona alkaloids, especially in malarial tracts, the Government of India in 1935 sanctioned the free distribution, from its own reserves, of 45,000 lb. of quinine to provincial Governments, subject to the condition that the quantities allotted would be distributed in addition to such supplies as were ordinarily provided. In effect, the provinces received amounts varying from two to seven thousand pounds of quinine, but

it is not possible as yet to indicate the results obtained. The great difficulty in India is to provide quinine at a cost which the poor villager can afford, and the present policy is to distribute available supplies at as cheap a rate as possible. Treatment packets of tabloids are available for sale at most village post offices, and, in addition, most Public Health Departments are able to make free distributions of the drug to those in urgent need.

During 1936, the Government of India sanctioned an additional grant of 10 lakhs of rupees (£75,000) for anti-malarial work. This grant has been placed at the disposal of the Indian Research Fund Association, which has decided to distribute it for the support of effective schemes to be carried out over a period of years in restricted areas.

12. NUTRITIONAL RESEARCH LABORATORIES.

For a number of years up to 1934, nutritional research in India was conducted by Major-General Sir Robert McCarrison, whose work is well known to nutritional workers throughout the world. On his retirement, Dr. AYKROYD was appointed as Director of Nutritional Research; his note on nutrition is attached. This branch of medical research has been so far entirely financed by the Indian Research Fund Association at a cost varying between Rs.80,000 and Rs.100,000 per annum (£6,000 to £7,500).

In 1926, a *Nutritional Advisory Committee* was formed, on which both human nutrition and animal nutrition workers are represented, the intention being to maintain a close liaison between these different branches of the subject. The Government of India last year also made an additional grant of a lakh and a half of rupees (£11,250), which has been earmarked for extensions in the field of human nutritional research.

13. SCHOOL OF TROPICAL MEDICINE, CALCUTTA.

Prior to 1920, it was customary for Indian medical graduates to go to Europe to obtain post-graduate courses in tropical medicine and hygiene. This was obviously incongruous, and,

in 1914, Sir Leonard Rogers conceived the idea of establishing institutes in India for postgraduate study in these subjects. The original proposal was to provide a School of Tropical Medicine in Calcutta and an Institute of Hygiene in Bombay, both these institutions being on an all-India basis. Various circumstances prevented the acceptance of this proposal, but by Sir Leonard Rogers' perseverance and enthusiasm, and with the generous assistance of the Government of India, the Government of Bengal and various private philanthropists, the Calcutta School of Tropical Medicine and Hygiene was opened in 1920 with a well-qualified staff capable of teaching and carrying out research in the fields of tropical medicine and of hygiene. The influence exerted by this institution in medical research, both in its educational rôle and by direct example, has been invaluable, not only to the people of India, but to the whole tropical world (see Appendix IV).

14. THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH.

When the School of Tropical Medicine was opened in 1920, a Professor of Hygiene was included in the teaching staff and a course of instruction was arranged for the Diploma of Public Health of the Calcutta University. There were obvious limitations to the scope of this arrangement. It became quickly evident, indeed, that, with increasing demands for admission to the D.P.H. class and because of the new situation arising from the transfer of public health control to local governments, "there should be some institution of an all-India character which would not only train graduates for the University D.P.H. but would provide those already engaged in public health work with facilities for training and for independent higher research, take up investigation of Indian health problems and questions and help to co-ordinate public health work all over India".

After investigation and consultation, the Rockefeller Foundation generously offered to provide the cost of an All-India Institute of Hygiene and Public Health to be erected in Calcutta in close proximity to the School of Tropical Medicine,

if the Government of India would agree to meet the recurring cost of such an institution. The Government of India gratefully accepted this munificent offer and the institute was duly opened early in 1932. It is maintained by the Government of India and its administration is controlled by the Public Health Commissioner acting under orders of the Director-General, I.M.S.

The Institute has six sections : (1) Public Health Administration, (2) Malariology and Rural Hygiene, (3) Epidemiology and Vital Statistics, (4) Nutrition and Bio-chemistry, (5) Sanitary Engineering and (6) Maternity and Child Welfare, each section being in charge of a professor and having the additional staff required for teaching and for research work. The School of Tropical Medicine and the Institute of Hygiene work in close co-ordination as regards teaching.

The Institute provides three courses of instruction :

(1) Course preparing students for the D.P.H. of the Calcutta University and the D.P.H. and Hygiene of the Faculty of Tropical Medicine, Bengal ;

(2) Course preparing students for the Doctorate of Science (Public Health) of the Calcutta University ;

(2) Special courses on bio-chemistry and nutrition, malariology, epidemiology and vital statistics, maternity and child welfare.

In addition, a considerable amount of research work is constantly in progress, many of the enquiries being financed by grants from the I.R.F.A. It is perhaps too early to assess the value which this institution will have to India ; but, in view of the great needs of the country in respect of advance in health matters, its primary function of training medical graduates in public health is one which has already largely justified its foundation.

15. CURATIVE AND PREVENTIVE ACTIVITIES.

The functions of the medical and public health organisation of the Government of India, it will be noted, are mainly advisory. It is, however, also indirectly concerned with curative and

preventive activities in a number of smaller areas which are under the control of the Central Government. These include Delhi Province, Ajmer-Merwara, Baluchistan and Coorg. As medical and public health activities in these areas are conducted on similar lines to those of the major provinces, reference may be made to the provincial reports for details.

The following table shows the numbers of health officers employed in rural areas in the different provinces of India :

Table showing the Distribution of Health Officers employed in Rural Areas in 1934.

	Medical officers of health				Number of districts	Districts employ- ing medical officers of health	Districts without medical officers of health
	Holding D.P.H. or equivalent degrees		Licentiates, L.P.H.				
	Whole time	Part time	Whole time	Part time			
Total	146	1	70	—	247	128	119
North-West Frontier Provinces	—	—	—	—	5	—	5
Punjab.	28	—	—	—	29	28	1
Delhi	1	1	—	—	—	—	—
United Provinces . . .	41	—	30	—	48	30	18
Bihar and Orissa. . . .	13	—	15	—	21	12	9
Bengal	28	—	8	—	26	26	—
Central Provinces . . .	—	—	—	—	19	—	19
Bombay	2	—	2	—	28	4	24
Madras.	30	—	15	—	25	25	—
Coorg.	—	—	—	—	1	—	1
Assam	—	—	—	—	13	—	13
Burma	3	—	—	—	31	3	28
Ajmer-Merwara	—	—	—	—	1	—	1

16. RURAL MEDICAL RELIEF.

Medical relief in the three Presidencies of Bengal, Madras and Bombay is controlled by Surgeons-General; in other major provinces by Inspectors-General of Civil Hospitals, and in the minor administrations of Delhi, Ajmer-Merwara,

Coorg and Baluchistan by less senior Chief Medical Officers. These officers advise local governments and administrations in all provincial medical matters.

The table given below gives details of medical relief institutions in British India in 1934.

Institutions for Medical Relief in British India in 1934.

	State (including railways)		Total
	Public, local fund, and private aided civil hospitals and dispensaries	Mental institutions	
1. Number of Institutes	5,202	19	5,221
2. Number of beds . .	57,701	9,518	67,219
3. Number of in-patients.	1,098,144	13,506	1,111,650
4. Number of out-patients	64,384,559	—	64,384,559
5. Total patients (3 & 4)	65,482,703	13,506	65,496,209
6. Number of operations performed . .	2,475,214	—	2,475,214
7. Total receipts in rupees	4,30,07,724	Not available	4,30,07,724
8. Total expenditure in rupees	3,71,94,518	Not available	3,71,94,518

In addition there are : (a) 850 special railway dispensaries ;
 (b) 845 private non-aided hospitals and dispensaries ;
 (c) 51 leper asylums ;
 (d) 29 tuberculosis sanatoria.

Excluding Delhi Province, there were, in 1934, a total of 4,251 hospitals and dispensaries following the Western system

of treatment, which gives an average of one institution for every 58,000 persons living in rural areas. Of these institutions, 84% were maintained either by Government or by local bodies, the remaining 16% being for the most part maintained by private organisations such as missionary associations, etc. The numbers in the different provinces are tabulated below :

North-West Frontier	43
Punjab	694
United Provinces	367
Bihar and Orissa	564
Bengal	726
Central Provinces	161
Bombay	201
Madras	1,107
Coorg	12
Assam	197
Burma	179
Total	<u>4,251</u>

During 1934, 323 salaried medical graduates and 3,782 licentiates in medicine were at work in rural areas. The numbers in the various provinces are as follows :

	Salaried graduates	Licentiates
North-West Frontier Province . . .	3	29
Punjab	57	675
Delhi	—	—
United Provinces	43	309
Bihar and Orissa	32	558
Bengal	80	693
Central Provinces	5	145
Bombay	11	200
Madras	80	822
Coorg	1	11
Assam	8	199
Burma	<u>3</u>	<u>141</u>
Totals	323	3,782

Even with these numbers, dispensary treatment is not within easy reach of many of the rural villages and the provision of medical relief generally cannot be said to be adequate, even although during the past two decades considerable expansion has taken place. This has been especially marked in the Punjab and in Madras Presidency, where considerable efforts have been made to induce private medical practitioners, by means of Government subsidies, to settle in rural tracts. In some of the other provinces, schemes for the promotion of medical relief on somewhat similar lines have also been introduced. As an illustration of this type of work, the following extract from the *Punjab Medical Report* may be quoted :

“ A private practitioner is placed in charge of a dispensary and is given Rs. 25 per mensem by way of a subsidy. The practitioner is not liable to be transferred to another dispensary without his consent, but in other respects is subject to the same conditions of service as the whole-time medical officers in charge of rural dispensaries. A whole-time dispenser who is an employee of the District Board is appointed to the dispensary on a salary of Rs.25 per mensem and a grant of Rs.500 per annum is given for drugs and instruments. The total cost is thus Rs.1,100 against Rs.2,500 for a rural dispensary under the existing official scheme. The practitioner has to make his own arrangements for servants and for miscellaneous expenditure. He is also entitled to charge for medicines supplied to patients, except to the very poor, in accordance with a scale which lays down the maximum chargeable.”

In regard to the part played by medical women in India, this is very undeveloped and no large-scale organisation exists. The present Women's Medical Service, which has a cadre of forty-two, is almost wholly concerned with work in urban centres, but in various provinces isolated attempts have been made to organise medical treatment for the women and children of rural areas.

In some cases of serious illness, the women come to the urban hospitals for treatment (development of motor transport has made this much easier), but for the great majority the only source of medical aid is the man doctor in charge of the local dispensary. For various reasons, many prefer to leave themselves in the hands of the village *dais*.

It may be of interest to include figures for medical colleges and schools in British India. The following table gives details:

	Number	Total students enrolled
Colleges	10	4,823
Schools	28	6,947

17. NURSING SERVICES.

The following table gives the total numbers of qualified nurses employed in provinces and the numbers at work in rural areas :

	Total	Rural areas		
		European	Indian	Total
Total	3,697	61	150	211
North-West Frontier				
Province	95	..	10	10
Punjab	280	2	3	5
Delhi	123	..	..	..
United Provinces . .	315	1	7	8
Bihar and Orissa . .	209	7	8	15
Bengal	805	7	10	17
Central Provinces . .	135	4	18	22
Bombay	646	7	15	22
Madras	583	22	31	53
Coorg	7	1	2	3
Assam	24	6	8	14
Burma	475	4	38	42

There are several reasons for the evident inadequacy of nursing services. In the first place, most rural medical institutions are meant for the treatment of out-patients only, hospitals with beds being provided only in the larger urban centres. Secondly, the nursing profession is still held in low esteem in most parts of India, and, so far, few Indian women find themselves able or willing to adopt a nursing career.

Attendance on the sick is therefore usually left to unskilled relatives or attendants, although in some parts to the country female compounders with a very elementary knowledge of general nursing and midwifery may be available. Unfortunately, midwifery work in rural areas is still largely in the hands of the untrained *dai* or barber midwife, although considerable efforts have been made in past years to give these women some training or to replace them by trained midwives. Here, also, one of the great difficulties is to get women of any education to take up midwifery as a profession.

The numbers of in-patients treated in hospitals and dispensaries during 1934, together with the cost of nursing, is given below :

	Patients	Expenditure		
		Total Rs.	Per patient Rs.	a.
Total	1,094,406	35,54,726	3	4
North-West Frontier				
Province	29,432	32,432	1	1
Punjab	206,810	1,96,604	0	15
Delhi	17,178	1,48,139	8	10
United Provinces. .	123,194	2,13,862	1	12
Bihar and Orissa .	75,511	1,27,491	1	11
Bengal	118,751	6,28,359	5	4
Central Provinces .	36,031	94,198	2	9
Bombay	115,775	6,29,311	5	7
Madras	231,623	9,30,410	4	0
Coorg	4,996	8,211	1	10
Assam	16,848	1,05,030	6	4
Burma	118,257	4,40,679	3	12

Nurses Registration Acts are in force in the Presidencies of Bengal, Bombay and Madras and in the provinces of Bihar and Orissa and United Provinces. In the Punjab, a Central Midwives Board has been constituted, whilst, in Bombay and

one or two other provinces nursing, associations have been formed with the object of advancing the status and training of the profession as a whole.

18. BUDGETS.

The budget of the Central Health organisation of the Government of India is largely devoted to payment of technical officers and secretarial staff. Expenditure on medicine and public health in the centrally administered areas, referred to in paragraph 15 above, corresponds in most respects with that in the various major provinces. Details of provincial expenditure on curative and preventive activities will be found in the reports of these provinces. It may be noted, however, that the Government of India, in 1935, made grants to provincial Governments aggregated over a crore of rupees (£750,000) to be spent on schemes for economic development and improvement of rural areas. The allotments and expenditure up to June 1936 are given below :

	Allotment Rs.	Expenditure up to June 1936 Rs.
North-West Frontier Province	3,00,000	1,02,500
Punjab	8,50,000	2,14,000
Delhi	50,000	12,500
United Provinces	15,00,000	1,50,000
Bihar	9,67,500	2,80,000
Orissa	3,10,000	1,10,000
Bengal	16,00,000	5,59,400
Central Provinces	5,00,000	1,18,700
Bombay	5,62,000	1,54,204
Sind	1,38,000	75,000
Madras	13,73,000	4,20,000
Coorg	5,00,000	26,800
Assam	5,00,000	76,000
Burma	5,00,000	46,000
Ajmer-Merwara	50,000	14,900

The scope for initiative and experiment in rural reconstruction is, of course, enormous, and the Government of India, when making these grants, indicated certain categories which in their view covered the most pressing needs of village life and offered the most practical benefit. These included :

- (1) Sanitary measures : (i) anti-malarial schemes ; (ii) village water supply, including well-boring ; and (iii) village sanitation, including drainage ;
- (2) Consolidation of holdings ;
- (3) Village roads ;
- (4) Discretionary grants to district officers for promotion of minor improvement works.

Some of the provinces have planned to devote the bulk of their allotment on such projects, but a considerable number of other schemes were put forward covering a wide range of activity, some of them representing entirely new departures. A few instances from individual provincial programmes are quoted in order to give some idea of the varied nature of the schemes intended to promote what is known as “ village uplift ”.

In Madras Presidency, it is proposed to spend 2.75 lakhs of rupees on the construction of borehole latrines, whilst it is also intended to allocate an additional amount towards the establishment of a health unit. In Bombay, a sum of Rs.42,000 has been allotted for the improvement of buffaloes and disposal of milk. In Bengal, provision for playgrounds and village halls has been made. In the United Provinces, nine health units are proposed in addition to that already in existence at Partabgarh, whilst in the Punjab a grant of 1.07 lakh of rupees has been set aside for broadcasting, cinema films and loud-speakers.

19. MENTAL DISEASES.

According to the census of 1931, the number of insane persons in British India was 98,449, whilst only 13,506 were housed in mental hospitals. These figures provide no accurate picture

of the actual numbers of insane persons in India. During 1934, there were nineteen mental hospitals in the various provinces of British India, these having accommodation for 9,518 patients. The following table gives details of accommodation and the numbers being treated :

	Number	Accommodation			Square feet per head
		Male	Female	Total	
British India . .	19	7,261	2,257	9,518	..
Punjab	1	826	182	1,008	70
United Provinces . .	3	1,208	406	1,614	50
Bihar and Orissa	2	1,120	372	1,492	50
Central Provinces . .	1	344	126	470	54
Bombay . . .	6	1,273	628	1,901	50-140
Madras	3	900	254	1,154	50
Assam	1	566	124	690	50
Burma	2	1,024	165	1,189	36-87

Mental hospitals also exist in the Indian States of Indore, Mysore (Bangalore), Baroda and Chimbhel, whilst in Hyderabad State an asylum for treating mental cases forms part of the central jail at Hyderabad. European patients from the United Provinces, Bihar and Orissa, Central Provinces, Bengal and Assam are sent to the European Mental Hospital at Ranchi, and the Indian Mental Hospital there treats Indian patients from Bengal and Bihar and Orissa. European cases in the Bombay Presidency are treated in a section of the Central Mental Hospital, Yeravda, which has 222 beds. Those in the Madras Presidency are housed in the Madras Mental Hospital, with an accommodation of 155 beds.

The following table gives provincial expenditure on the maintenance and upkeep of mental institutions in 1934 :

	Total Rs.	Diet Rs.	Bedding and clothing Rs.	Medicines Rs.
British India.	34,77,370	8,54,237	1,17,826	16,865
Punjab . . .	4,37,281	91,923	22,437	1,533
United Provinces .	2,30,871	65,096	11,730	945
Bihar and Orissa :				
European .	4,94,623	1,49,814	23,766	1,789
Indian . .	3,79,823	60,886	9,373	3,914
Central				
Provinces .	1,05,655	32,160	5,077	47
Bombay . .	7,04,583	1,77,106	30,278	1,601
Madras . . .	5,03,474	1,80,400	7,693	1,441
Assam . . .	1,18,571	40,564	6,671	157
Burma . . .	5,02,489	56,288	801	5,438

One point which must be mentioned is the almost universal belief that insanity is due to possession by demons. Patients are not usually brought to a mental hospital until every form of indigenous treatment has been employed, so that they are nearly always incurable by the time they seek admission.

20. LEGISLATIVE MEASURES WHOLLY OR PARTLY DEALING WITH PUBLIC HEALTH.

A list of Acts in force in different provinces in British India is attached (Appendix II). This list will give some idea of the enactments which, either wholly or in part, provide for the control of public health.

Appendix I.

RETURNS RECEIVED BY AND ISSUED FROM THE OFFICE OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA.

A. *Returns received.*

1. Weekly statements of deaths from principal diseases in the chief seaport towns of India—*e.g.*, Bombay, Calcutta, Madras, Karachi, Rangoon, Bassein and Moulmein.
2. Weekly returns of epidemic diseases in the various provinces of India and in certain Indian States.
3. Weekly returns of births and deaths from provincial diseases in large towns in the various provinces of British India.
4. Monthly returns of vital statistics recorded in towns and districts (excluding towns) in the various provinces of British India and certain Indian States.
5. Epidemic diseases telegrams from the Directors of Public Health of the various provinces and the Port Health Officers of the chief seaport towns.
6. Telegraphic communications from the Office international d'Hygiène publique, Paris, when any foreign country declares a port town of India either as infected or free from any of the conventional diseases.
7. Consolidated monthly returns of sick prisoners in the district and central jails of various provinces of British India.
8. Wireless message in code and in clear from the Director, League of Nations Eastern Bureau, Singapore.

B. *Returns issued.*

1. Epidemic diseases summary, Parts I and II.
2. Weekly statement showing mortality from principal diseases in the chief seaport towns.
3. Weekly statement showing statistics of reported attacks and deaths from cholera, smallpox and plague in British India and India States.
4. Weekly statement of births and deaths from principal causes in towns in British India with a population of 30,000 or over.
5. Quarterly abstract of vital statistics in British India and certain Indian States.
6. Weekly telegram to the Health Section of the Eastern Bureau of the League of Nations.
7. Weekly telegram to the Ministry of Health, London.
8. Weekly decoded message as received by wireless from the Director, League of Nations Eastern Bureau, Singapore, in code.

9. Weekly message as received by wireless from the Director, League of Nations Eastern Bureau, Singapore, in clear.
10. Weekly statement showing the degree of infection with regard to cholera, smallpox and plague in towns dealing with aerial traffic.
11. Monthly vital statistical returns relating to towns and districts (excluding towns) in various provinces of British India to the Health Section of the League of Nations, Geneva, and the Ministry of Health, London.

Appendix II.

LIST OF ACTS IN FORCE IN DIFFERENT PROVINCES IN BRITISH INDIA DEALING WHOLLY OR IN PART WITH PUBLIC HEALTH.

North-West Frontier Province.

1. The Punjab Pure Food Act (Punjab Act VIII of 1929) and North-West Frontier Province Pure Food Rules, 1931.

Punjab.

1. Adulteration of Food Act, 1919.
2. Village Panchayat Act of 1921.
3. Vaccination Law Amendment Acts of 1918, 1925 and 1929.
4. Nurses Registration Act of 1932.
5. District Boards Act, 1883, as modified up to May 8th, 1925.

United Provinces.

1. Epidemic Diseases Act (Act III of 1897).
2. Vaccination Act, 1880 (Act XIII of 1880), as amended by United Provinces Act II of 1907, the Decentralisation Act IV of 1914 and the Devolution Act XXXVIII of 1920.
3. Factories Act, as amended from time to time.
4. Sarais Act, 1867 (Act XXII of 1867).
5. Tea Districts Emigrant Labour Act, 1932 (Act XXII of 1932).
6. Northern India Canal and Drainage Act, 1873.
7. Certain sections of the Indian Penal Code.
8. Certain sections of the Criminal Procedure Code.
9. District Boards Act, 1922 (Act X of 1922), as amended from time to time.
10. Village Panchayats Act, 1920 (Act VI of 1920).
11. Model Bye-laws framed under Section 174(2) of District Boards Act, 1922.

12. Prevention of Adulteration Act, 1912 (Act VI of 1912), as amended by the United Provinces Acts No. I of 1916, No. II of 1930 and No. XIII of 1932.
13. Village Sanitation Act, 1892, as amended by Act V of 1929.
14. Nurses, Midwives, Assistant Midwives and Health Visitors Registration Act, 1934.

Bihar and Orissa.

1. Food Adulteration Act, 1919 (II of 1919).
2. Places of Pilgrimage Act, 1920.
3. Mining Settlements Act, 1920.
4. Village Administration Act, 1922 (III of 1922).
5. The Local Self-government Act of 1885, as modified in June 1923.
6. The Factories Rules, 1929.
7. Rules for training of sanitary inspectors.
8. Rules prescribing qualifications for health officers.
9. Rules under the Food Adulteration Act.
10. Local Government resolution regarding Public Health schemes.
11. The Mela Manual.

Bengal Presidency.

1. Indian Penal Code, 1860.
2. Local Self-government Act, 1885.
3. Village Self-government Act, 1919.
4. Food Adulteration Act, 1919, as modified up to 1926.
5. Agriculture and Sanitary Improvement Act, 1920.
6. Vaccination Act, 1880, as modified up to 1912.
7. Births and Deaths Registration Act, 1873 (as modified up to 1925).
8. Indian Epidemic Diseases Act, 1897.
9. Rural Development Bill (1935).
10. Village Self-government Act, 1919.
11. Local Self-government Act, 1885, as modified up to 1915.
12. Children Act, 1922.
13. The Factories Act, 1934, and the Bengal rules framed thereunder.
14. Workmen's Compensation Act, 1923.
15. Employers' Liabilities Act.
16. Mining Settlement Act, 1912, as modified up to 1915.
17. Guide to Laws and Orders in force in Bengal, 1935, Volume XVI.
18. Agricultural and Sanitary Improvement Act, 1920.

Central Provinces.

1. Leper Act.
2. Epidemic Diseases Act.
3. Vaccination Act.

4. Village Sanitation and Public Management Act, introduced in 1920.
5. Village Panchayat Act ; Chapter III pertaining to sanitation, 1920, as amended in 1928.
6. Mukaddam Rules pertaining to Village Sanitation.
7. Prevention of Adulteration Act.
8. Juvenile Smoking Act.
9. The Central Provinces Public Health Manual.

Bombay Presidency.

1. Local Boards Act, 1923.
2. Village Sanitation Act, 1889, as amended in 1931.
3. District Vaccination Act, 1892.
4. Prevention of Adulteration Act, 1925.
5. Lepers Act, 1898.
6. Epidemic Diseases Act, 1897.
7. Births, Deaths and Marriages Registration Act, 1886.
8. Indian Factories Act, 1911.
9. Village Panchayat Act, 1933.
10. Maternity Benefit Act, 1929.

Madras Presidency.

1. Epidemic Diseases Act.
2. Local Boards Act, 1920 (XV of 1920).
3. Public Resorts Act, 1888.
4. Prevention of Adulteration Act, 1918 (III of 1918).
5. Suppression of Immoral Traffic Act, 1930.
6. Indian Factories Act.
7. Nurses and Midwives Act, 1926.
8. Rules for the working of vaccination (G.O. No. 832, P.H., dated May 23rd, 1923).
9. Plague Regulations (G.O. No. 1146, P.H., dated July 10th, 1926).
10. Plague Standing Orders (G.O. No. 1453, P.H., dated August 30th, 1923).

Coorg.

1. Epidemic Diseases Act, 1897.
2. Registration of Births and Deaths Act, 1932.

Assam.

1. Rules under Bengal Vaccination Act V of 1880.
2. Epidemic Diseases Act III of 1897.
3. Plague Regulations.
4. Smallpox Regulations.

5. Kala-Azar Regulations.
6. L.S.G. Act.
7. Factories Act, 1911 (XII of 1911).
8. Mines Act of 1923.

Burma.

1. Vaccination Law Amendment Act, 1928.
2. Epidemic Diseases Manual.
3. Midwives and Nurses Act, 1922.
4. Food and Drugs Act, 1928.
5. Rural Self-government Act, 1921, as modified in 1925.
6. Rural Self-government Rules.
7. Village Manual.

Ajmer-Merwara.

1. The Punjab Pure Food Act.
2. The Bombay Maternity Benefit Act, 1929.

Appendix III.

HEALTH BULLETIN SERIES.

1. A Lecture delivered to the Members of the Darjeeling Planters, Association on April 29th, 1916, on the Incidence, Effects and Prevention of Hookworm Infection, as they concern the Planter, by Lieutenant-Colonel Clayton LANE, I.M.S. ; 6 annas or 9d.
2. Lecture on the Responsibility of Men in Matters relating to Maternity, read by Dr. A. LANKESTER, M.D., at the Maternity and Child Welfare Exhibition held at Delhi in February 1920 ; 4 annas or 6d.
3. Lecture on Mosquitoes and House-flies, by Major F. W. CRAGG, M.D., I.M.S. ; 4 annas or 6d.
4. Lecture on Flies, read by Major F. W. CRAGG, M.D., I.M.S., at the Maternity and Child Welfare Exhibition held at Delhi in February 1920 ; 4 annas or 6d.
5. Lectures on Malaria, by Lieutenant-Colonel Sir S. R. CHRISTOPHERS, C.I.E., O.B.E., I.M.S. ; 4 annas or 6d.
6. A Lecture on Tuberculosis, by Lieutenant-Colonel W. Glen LISTON, C.I.E., M.D., D.P.H., I.M.S. ; 1 rupee or 1s. 9d.
7. A Lecture on Dracontiasis or Guinea-worm Disease, by Lieutenant-Colonel W. Glen LISTON, C.I.E., M.D., D.P.H., I.M.S. ; 1 rupee 14 annas or 3s. 3d.
8. Malaria Bureau, No. 1. Instructions for collecting and forwarding Specimens in connection with the Investigation of Mosquitoes and Malaria in India, by Colonel Sir S. R. CHRISTOPHERS, C.I.E., O.B.E., I.M.S. (out of print) ; 2 annas or 3d.

9. Treatment Campaign against Kala-azar, Assam (including Practical Instructions regarding the Organisation of Kala-azar Treatment Centres), by Major T. D. MURISON, I.M.S. ; 3 annas or 4*d*.
10. Malaria Bureau, No. 2. Synoptic Table for the Identification of the Anopheline Mosquitoes of India, 2nd Edition, by Colonel Sir S. R. CHRISTOPHERS, C.I.E., O.B.E., I.M.S., Lieut.-Colonel J. A. SINTON, V.C., O.B.E., I.M.S., Lieut.-Colonel G. COVELL, M.D., I.M.S., and Captain P. J. BARRAUD, F.E.S., F.Z.S., F.L.S. ; 2 annas or 3*d*.
11. Malaria Bureau, No. 3. Anti-mosquito Measures, 4th Edition, by Lieut.-Colonel G. COVELL, M.D., I.M.S. ; 4 annas or 5*d*.
12. Malaria Bureau, No. 4. Table for the Identification of some Indian Freshwater Fish (out of print).
13. Malaria Bureau, No. 5. Instructions for collecting and forwarding Mosquitoes, 2nd Edition, by Lieut.-Colonel J. A. SINTON, M.D., D.Sc., I.M.S. ; 12 annas or 1*s*. 3*d*.
14. Malaria Bureau, No. 6. How to do a Malaria Survey, by Colonel Sir S. R. CHRISTOPHERS, I.M.S., Lieut.-Colonel J. A. SINTON, I.M.S., and Lieut.-Colonel G. COVELL, I.M.S., 3rd Edition, revised by Lieut.-Colonel J. A. SINTON, I.M.S. (in press).
15. Maternal Mortality in Child-birth in India ; 2 annas or 3*d*.
16. Malaria Bureau, No. 7. Synoptic Tables for the Identification of the Full-grown Larvæ of the Indian Anopheline Mosquitoes, 2nd Edition, by Dr. I. M. PURI, M.S., Ph.D., F.R.E.S. ; 4 annas or 5*d*.
17. Malaria Bureau, No. 8. The Distribution of Anopheline Mosquitoes in India, by Lieut.-Colonel G. COVELL, M.D., D.P.H., I.M.S. ; 6 annas or 8*d*.
18. Malaria Bureau No. 9. A Practical Entomological Course for Students of Malariology, by Captain P. J. BARRAUD, F.R.E.S., F.Z.S., F.L.S. ; 1 rupee 10 annas or 2*s*. 9*d*.
19. Report of a Tour to Study Port Health Work in the Far East, by Dr. J. A. ANKLESARIA, M.B., B.S., D.P.H., Port Health Officer, Rangoon ; 1 rupee 2 annas or 2*s*.
20. Suggestions with regard to the Prevention of the Spread of Yellow Fever to India by Air Traffic, with Special Reference to Insect Transmission, by Lieut.-Colonel J. A. SINTON, M.D., D.Sc., I.M.S. ; 5 annas or 6*d*.
21. A Note on Hydrocyanic Acid Gas Fumigation of Rat Burrows as an Anti-plague Measure, by Major W. J. WEBSTER, M.C., I.M.S. ; 3 annas or 4*d*.
22. Man-made Malaria in India, by Lieut.-Colonel J. A. SINTON, M.D., I.M.S., and Professor Raja RAM, B.Sc., A.M.Inst.C.E., F.R.San.I. ; 4 annas or 5*d*.
23. The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets, by Dr. W. R. AYKROYD (under publication).

Appendix IV.

NOTE ON THE SCHOOL OF TROPICAL MEDICINE, CALCUTTA.

by

Brevet-Colonel R. N. CHOPRA, C.I.E., K.H.P., I.M.S., Director, School of Tropical Medicine.

The School of Tropical Medicine, established in 1921 through the efforts of Sir Leonard Rogers, consists of : (1) the school proper, and (2) the Carmichael Hospital for Tropical Diseases. Sir L. Rogers collected funds for the building of the hospital and for an endowment to be utilised for the purpose of furthering research in tropical diseases. The school building was built by the Government of Bengal, which also undertook to pay the entire recurring cost of the staff. The Government of India paid a lump sum of 5 lacs of rupees towards the initial cost.

The school is the only post-graduate and research institution in the East. The hospital for tropical diseases is one of the few institutions meant entirely for research. The staff of the school consists of : (1) the professorial staff, who do both teaching and research and who are maintained by the Government of Bengal, with the exception of two professorships which are paid for by the Indian Research Fund Association ; (2) the research staff, which are paid by the Endowment Fund collected by Sir L. Rogers.

This institution provides two courses of instruction annually, one of six months' and the other of three months' duration.

The longer is a post-graduate clinical and laboratory course, beginning on October 15th and ending on April 14th. All students who complete this course are eligible as candidates for the (D.T.M.) Diploma in Tropical Medicine, which is granted by the Faculty of Tropical Medicine and Hygiene, Bengal.

The shorter course is held from July 15th to October 14th. All students who complete this course are eligible as candidates for a (L.T.M.) Licence in Tropical Medicine, which is granted by the Faculty of Tropical Medicine and Hygiene, Bengal.

The staff of this institution also teach the D.P.H. students of the All-India Institute of Hygiene and Public Health in the following subjects :

- (1) Bacteriology and pathology ;
- (2) Helminthology ;
- (3) Protozoology ;
- (4) Entomology ;
- (5) Public health laboratory practice ;
- (6) Physics and chemistry.

Subject to the approval of the Surgeon-General with the Government of Bengal, this institution also admits qualified students desirous of undertaking special lines of study in research for periods not exceeding six months.

During the last sixteen years of its existence, the school has been recognised as one of the premier institutions both in teaching and research. Apart from the grants from the Government of Bengal, the school receives the income from the Endowment Fund and grants from the Indian Research Fund Association to carry on its research activities.

The following research enquiries are being conducted under the Endowment Fund.

- (1) Leprosy research ;
- (2) Respiratory and anæmia research ;
- (3) Helminthology research ;
- (4) Bowel diseases research ;
- (5) Diabetes research ;
- (6) Filariasis research ;
- (7) Standardisation work in Indian foodstuffs ;
- (8) Health propaganda ;
- (9) Medical mycology (partly) ;
- (10) Malaria research ;
- (11) Bio-chemistry research ;
- (12) Synthetic drugs research.

The following research enquiries are being conducted under the Indian Research Fund Association :

- (1) Indigenous drugs enquiry ;
- (2) Drug-addiction enquiry ;
- (3) Malaria transmission enquiry ;
- (4) Cholera bacteriological enquiry ;
- (5) Cholera clinical enquiry ;
- (6) Medical mycology enquiry (part) ;
- (7) Helminthological enquiry ;
- (8) Kala-azar continuity enquiry ;
- (9) Enquiry into anæmia of women ;
- (10) Leprosy enquiry ;
- (11) Filariasis enquiry ;
- (12) Epidemic dropsy enquiry :
 - (a) Bacteriological section ;
 - (b) Epidemiological section.

The following chairs are maintained by the Government of Bengal.

- (1) Professor of Tropical Medicine ;
- (2) Professor of Pharmacology, including indigenous drugs ;
- (3) Professor of Pathology, Bacteriology and Helminthology (subsidised by the I.R.F.A.) ;
- (4) Professor of Protozoology ;
- (5) Professor of Entomology ;
- (6) Professor of Chemistry and Physics ;
- (7) Professor of Public Health Laboratory Practice ;
- (8) Professor of Hygiene, Government of India officer ;
- (9) Professor of Serology, Government of India officer.

Besides the above, there are two lecturers (*viz* : (1) on infectious diseases and (2) on tropical surgery) maintained by the Government of Bengal.

The following research chairs are maintained by the Endowment Fund of this institution.

- (1) Respiratory research ;
- (2) Hookworm research ;
- (3) King Edward Memorial leprosy research ;
- (4) Bowel diseases research ;
- (5) Filariasis research ;
- (6) Diabetes research (Dr. A. MITRA Fund).

The Carmichael Hospital for Tropical Diseases forms an integral part of the School of Tropical Medicine and accommodates more than a hundred patients, who are specially selected because of their suitability for purposes of research and instruction in tropical diseases. It has ninety-two beds in the open ward and fourteen cabins for special accommodation. There is an out-patient department in which a large number of cases of kala-azar, leprosy, tropical skin diseases and general tropical diseases are treated. The clinical material which is available is probably greater and more varied than that found in any institution for the treatment of tropical diseases in the world.

In the school itself, a museum and picture gallery of tropical medicine has been organised and it is developing gradually.

2. NUTRITION IN INDIA.

By

W. R. AYKROYD,

Director of Nutrition Research, Indian Research Fund Association.

I propose first to outline the problems of nutrition in India, briefly summarising knowledge at present available. This part of the report will contain data directly related to the various items on the agenda of the nutrition section of the Conference. Secondly, the various items will be dealt with separately, and suggestions made regarding research and action in India and other Eastern countries. Thirdly, consideration will be given to the recommendations which might suitably be made by the Conference and the possibility of future international collaboration and action.

THE DEFECTS OF FOOD SUPPLY AND DIET IN INDIA.

What grounds are there for supposing that a problem of malnutrition exists in India ? Have we any exact data about

its extent and seriousness? An obvious reply to the first question presents itself. India during all the centuries of her recorded history has suffered from periodic famines, and still suffers. If famine does not to-day cause widespread loss of life it is because of the existence of famine relief agencies which make use of modern transport to supply food from elsewhere to the victims. There must be a serious problem of under- and malnutrition in a country in which large areas may, at any time, as a result of some accident of weather, suffer from famine calling for energetic measures of relief. The diet of the people in districts prone to periodic famine is likely, at the best of times, to be deficient in quantity and quality.

A good deal of more detailed evidence has been gathered showing that what may be described as "average Indian diets" are deficient in various respects, and it is possible to make a reasonably satisfactory analysis of their deficiencies. The method of approach has been the study of total production in relation to the nutritive requirements of the population; the detailed study of the diets of sample groups and their comparison with a given standard; the clinical investigation of sample groups to discover their "state of nutrition" and the frequency with which they suffer from various deficiency diseases which are known to be caused by insufficiency of various food factors in the diet.

DIETARY STANDARDS.

To assess the adequacy of diets, a standard of comparison is necessary. If the diets of poor families in villages and towns are compared, even in a rough qualitative way, with, let us say, the standards suggested by the League of Nations Commission in the report "The Physiological Bases of Nutrition", it is at once obvious that the former are grossly inadequate in terms of the latter. Similarly, in a well-known series of experiments carried out by McCARRISON, it was shown that the development of rate on diets resembling those consumed in Madras, Bengal and other large areas of the country was greatly inferior to that of animals fed on a richer diet. But caution is necessary in applying Western dietary standards to the East; the former purport to represent the *optimum*

and allow a high “margin of safety”. The results of animal experiments may not be entirely applicable to man. Human beings can attain a *reasonably satisfactory* “state of nutrition” on diets which are thoroughly deficient in terms of the League of Nations standards. The nutrition worker in the East is prepared to reduce his standard of satisfactory nutrition; he will not, for example, label a diet deficient because it does not supply 80 grammes of protein daily, and because its content of animal protein is very small relative to that of vegetable protein, or because animal fat is totally absent. He will not insist that a growing child should consume a litre of milk a day. In preparing a “Health Bulletin” on “The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets”, to be used for public health nutrition work in India, I have suggested standards of calorie, protein, fat, mineral and milk intake far below “generally accepted” Western standards, because there is no point in putting forward standards out of all relation to reality. This bulletin will be available for study by members of the Conference, and the standards suggested need not be described in detail here.

But even when dietary standards have been reduced to a “minimum” point which may be difficult to justify on scientific grounds, Indian dietaries are found to be deficient in terms of such standards.

FOOD SUPPLY IN THE MADRAS PRESIDENCY.

The Madras Presidency, with a population of some 48 millions, occupies a large part of South India. An attempt has been made (Table I) to calculate the food supply available in a single year (1933/34) and assess its value in calories, etc., per consumption unit and *per capita*. The main basis of the calculation was the production data given in the “Season and Crop Reports, Madras Presidency, 1933/34”. It is to be observed that these data are subject to a high “margin of error”, and that some of the figures given in column 1, representing intake of various foods per day in ounces, are mere assumptions, based on the scanty information available. The table is

nevertheless sufficiently accurate to supply a general idea of food production and consumption in a large area of India.

Table I. — PHYSIOLOGICAL VALUE OF FOOD AVAILABLE.

Calories, Proteins, Fats and Carbohydrates available per Consumption Unit per Day.

(Madras Presidency, 1933/34.)

	Ounces per consumption unit per day	Proteins (grammes)	Fats (grammes)	Carbo- hydrates (grammes)	Calories
Rice (including imports) . . .	12.240	23.75	1.91	275.40	1,212
Cholam	2.499	6.96	2.81	47.28	242
Cambu	1.400	5.10	1.93	27.16	147
Ragi	2.070	5.75	0.95	48.33	226
Korra.	0.470	1.03	0.63	9.49	47
Varagu	0.540	1.18	0.72	10.91	54
Samai.	0.180	0.39	0.24	3.64	18
Maize	0.090	0.19	0.04	1.87	9
Green gram	0.057	0.39	0.02	0.98	6
Black gram	0.028	0.19	0.01	0.49	3
Red gram	0.110	0.72	0.11	1.78	11
Bengal gram	0.035	0.16	0.04	0.64	4
Pulses (imported)	0.410	2.67	0.41	6.64	41
Mutton and goat's flesh . . .	0.090	0.54	0.18	—	4
Eggs	0.043	0.16	0.13	—	2
Groundnut oil	1.050	—	29.40	—	265
Gingelly oil	1.100	—	2.80	—	25
Coconut oil	0.080	—	2.20	—	20
Sugar-cane (jaggery)	0.860	0.07	—	21.50	86
Other sugars	0.630	0.05	—	15.75	63
Cow's milk.	0.250	0.23	0.26	0.34	4
Buffalo's milk	0.490	0.66	1.07	0.61	15
Fish	0.290	1.49	0.06	—	6
Per consumption unit . . .	—	51.68	45.92	472.81	2,510

(Without vegetables, fruits and goat's milk.)

Percentage of total calories derived from cereals = 77.9.

N.B. — The number of consumption units in (man value of) the population was calculated by using a modification of the earlier League of Nations Scale of Family Coefficients (1932) (*Quart. Bull. Health Organisation*, I, 3, page 477).

Food consumption in terms of calories and proximate principles for Japan and the United Kingdom has been calculated by GREY¹ and ORR² respectively. The figures given by these workers are *per capita* figures, and, for purposes of comparison, per capita consumption of the Madras Presidency has also been calculated. The conversion of "per consumption unit" figures into *per capita* figures involves a reduction of about 18%. The three series of figures are given in Table II.

Table II. — COMPARISON OF THE FOOD SUPPLY OF THE MADRAS PRESIDENCY (1933) WITH THAT OF JAPAN (1927) AND THAT OF THE UNITED KINGDOM (1934) (*per capita*).

	Japan (1927)	United Kingdom (1934)	Madras Presidency (1933)
Protein: Animal (grammes)	15.9	46	2.6
Vegetable (grammes)	72.6	41	40.0
Total protein (grammes).	88.6	87	42.6
Fat: Animal (grammes)	3.5	109	1.3
Vegetable (grammes)	14.2	15	36.5
Total fat (grammes)	17.7	124	37.8
Carbohydrate (grammes)	537.6	425	398.5
Calories	2,732	3,246	2,068

The analysis of the food supply of the Madras Presidency, in spite of its inaccuracies, illustrates and defines the problem of nutrition in the East. In all probability, similar investigations in many of the provinces of India, in Ceylon and other Eastern countries would provide similar data. It is on this foundation, so to speak, that it is necessary to build.

2,500 calories per consumption unit per adult man may perhaps be taken as representing daily requirements in South India and other Eastern countries. The method by which this

¹ GREY, "The Food of Japan, 1928". League of Nations, document C.H.681.

² ORR, 1936, "Food, Health and Income". Macmillan.

estimate was arrived at is given in the appendix. The total calculated food supply of the Madras Presidency is, on this reckoning, just sufficient to cover the energy needs of the population, provided it is evenly distributed. But, of course, it is not evenly distributed, and so low a mean intake suggests that large sections of the population do not get *enough* to eat. *In considering the problem of nutrition in the East, primary emphasis must be placed on quantity.* “Enough food” takes precedence over “the right sort of food”.

As regards quality, the diet of the Madras Presidency is largely composed of cereals and lacks what are nowadays called the protective foods. The supply of protein is low and that of animal protein almost negligible. The total production of fat is sufficient to allow for a reasonably adequate *per capita* intake, but a proportion (unknown) of the fat available is used for inunction. Consumption of animal fat is very low, so that vitamin A (*strictu sensu*) intake is almost negligible.

Milk production *per capita* was calculated at a small figure, which is in conformity with the observation that the mass of the population consumes milk in tiny quantities or not at all. Even if the supply of milk, eggs and meat has been considerably under-estimated and double the quantity of each is available, it is clear that these foods are unimportant items in the diet of the people.

The supply of vegetables and fruits, which contain carotene, the precursor of vitamin A, and other valuable food factors, is scanty; this is shown by general and detailed observation. There is a deficiency of vitamin B₂, vitamin C and mineral elements considered of importance in nutrition, notably iron and calcium.

Detailed Diet Surveys.

Only a few diet surveys have so far been undertaken in India, and the ground covered has not been large. The information available, however, confirms the impressions given by a broad survey of food supply with regard to diet deficiency. For example, a twenty days' survey of a small group of village families gave the following figures for intake of calories,

proximate principles, calcium and phosphorus per consumption unit :

Protein	36.00
Fat	5.00
Carbohydrate	369.00
Calcium	0.69
Phosphorus	0.75
Calories	1,660

These families were living on an insufficient quantity of rice, with very small amounts of other foods. The deficiencies of the diet described need no comment. The low average calorie intake may be contrasted with that observed in a series of very poor Roumanian peasant families, which was in the neighbourhood of 4,000 per consumption unit per day.¹

Of forty-four typical village families studied in diet surveys in the Madras Presidency, only thirteen consumed milk or milk products during the period of investigation (twenty days), and of these only four consumed them in amounts exceeding 4 oz. a day. Intake of meat and eggs was negligible, and that of pulses small (average below 1.5 oz.). It was observed that fruit and vegetables were unimportant elements in the diets, being absent altogether from the diet of a large percentage.

MALNUTRITION AND DEFICIENCY DISEASE.

The study of food supply and diet, therefore, leads to the conclusion that Indians of the poorer classes consume an inadequate and ill-balanced diet. Another method of approach leads to similar conclusions. The clinical examination of groups of school-children in towns and villages reveals that a high percentage of children show visible symptoms of food-deficiency disease. We have examined over 4,000 school-children in various South Indian towns, and found that some 15% of these showed either stomatitis due to vitamin B₂ deficiency, xerophthalmia, or a follicular keratosis of the skin known as "toad-skin"

¹ AYKROYD, ALEXA and NITZULESCU. League of Nations, document C.H. 1205.

or “phrynoderma”, which there is good reason to suppose is due to a diet deficiency. While these symptoms may not in themselves cause invalidism, their presence is evidence of poor general state of nutrition, and we have found that children showing such symptoms are visibly in wretched health and tend to be “selected” as malnourished by the A.C.H. index of nutrition. Symptoms were observed in a larger percentage of children of the poorer classes than of children of the more prosperous classes; in schools attended by the children of the well-to-do, and in children’s hostels where careful and intelligent attention is given to diet, they are not seen at all. A point of importance is that a higher incidence of deficiency disease has been noted among children of the poorer classes in the towns than in poor village children. The probable reason for this is that the poor in the towns eat milled rice, while the villager usually eats millet, or rice in the home-pounded state. While living standards in India remain at their present level, the extension of mechanical rice-milling in rural areas should not be encouraged.

Striking evidence that average Indian children are in a subnormal state of nutrition was provided by experiments with skimmed milk. A mission boarding-school containing 122 boys, the majority of whom were between the ages 11 and 15, was chosen as the venue of an investigation. The diet supplied in this hostel was fairly typical of diets consumed in many parts of India. It was based on rice and millet and contained very small quantities of vegetables and no milk.

The school was divided into two groups by random selection. One group received the ordinary hostel diet supplemented by 1 oz. of New Zealand skimmed milk powder, given daily in liquid form as 8 oz. of reconstituted skimmed milk. The other group consumed the hostel diet alone with a little additional millet, so that calorie intake was roughly similar in both groups.

The skimmed milk was given for fourteen weeks. The boys were weighed and measured at the beginning and end of this period. The average increase in weight in the milk-fed group was 4.7 lb., as compared with 2.1 lb. in the group not receiving milk. Average increase in height in the former group was 0.61 inch as compared with 0.35 inch in the latter.

The groups were now reversed, the boys not previously receiving milk being supplied with 1 oz. of powder daily, while the earlier "milk" group went without milk. This second experiment lasted for 10½ weeks, a somewhat shorter period than that covered by the first experiment. Average weight and height increments in the milk-fed group were 3.07 lb. and 0.69 inch respectively; in the "non-milk" group 1.1 lb. and 0.43 inch. The hostel diet remained the same throughout the two periods of the experiment; the addition of skimmed milk was the only variable.

In other children's hostels, similar height and weight increments were observed as the result of giving skimmed milk. The consumption of milk improved the general condition, health and appearance of the children, and reduced the frequency of minor ailments. These experiments show clearly that average Indian diets are deficient in elements contained by skimmed milk, and that the addition of skimmed milk would greatly enhance the nutritive value of such diets.

Further evidence of widespread malnutrition is provided by blood examinations. It has been found that the hæmoglobin content of the blood of Indian children is some 20% or more below European standards. This low hæmoglobin figure does not appear to be physiological; it is evidence of mild anæmia resulting from the consumption of a diet poor in iron. If large doses of iron are given to South Indian children, their hæmoglobin rapidly rises. It is therefore probable that the average South Indian diet contains insufficient iron to maintain the blood in a fully satisfactory condition.

Preliminary clinical experiments suggest that a large proportion of the population may be in a state of "vitamin C sub-nutrition", which is in conformity with the observation that intake of fruit and vegetables is, in general, small. Overt scurvy does not, however, appear to be common. The relation between a low intake of vitamin C and "state of nutrition" needs further investigation.

The prevalence of food-deficiency diseases, such as beriberi, peripheral neuritis in pregnant women, the anæmias of pregnancy, keratomalacia, etc., is also proof that the diet of large sections of the population is grossly defective. Apart

from diseases which are known with certainty to be due to deficient diet, one observes in Indian hospitals a variety of obscure degenerative conditions which are probably related to malnutrition. Future research will probably show that a large percentage of sickness and invalidism in the East is directly or indirectly due to faulty diet.

The situation as regards nutrition is, of course, not the same in all parts of India. In certain districts in the North, for example, where whole wheat is the staple cereal and relatively large quantities of milk are consumed, the "state of nutrition" of the population appears to be on the whole good, and symptoms of deficiency disease are infrequent in school-children. In the North of India, however, diseases associated with vitamin D deficiency—rickets and osteomalacia—are met with; these are less common or absent in other parts of India.

The account of the problem of nutrition in South India given here is probably, in general, applicable to other countries in the East—*e.g.*, Ceylon, Siam, Java, etc.

AGENDA : ITEMS 1 AND 2.

Item 1 apparently related to the composition of the *diet* and the methods of its preparation. The composition of the diet cannot be studied to any purpose without knowledge of the nutritive value of foodstuffs, so that the two items will be considered together.

The Nutritive Value of Foodstuffs.

An investigation into the nutritive value of common Indian foodstuffs is in progress in the Coonoor Laboratories. Some 200 foodstuffs have been analysed to discover their content of calories, protein, fat, carbohydrate, calcium, phosphorus and iron. A somewhat smaller number have been assayed for vitamin A and carotene by a spectrographic method. The vitamin C content of all important fruits and vegetables has been determined by chemical analysis, and the vitamin B₂ content of some fifty foodstuffs has been investigated by biological assay. The results of this work on foodstuffs have

been incorporated in the "Health Bulletin" on "The Nutritive Value of Foodstuffs and the Planning of Satisfactory Diets", to which previous reference has been made.

It must be emphasised that, while the chemical analysis and vitamin assay of raw foodstuff samples is an essential *preliminary* to the study and attack of the problems of nutrition, it is only a preliminary. The investigation of nutritive value needs to be extended in various directions. The effect of preparation and cooking on chemical and vitamin content must be studied. Attention must be given to the problem of the biological value of proteins and that of the *assimilability* of various factors—*e.g.*, iron, calcium, phosphorous—contained in different foods. All these questions are being investigated in the Coonoor Laboratories and at other centres in India.

The nutritive value of foodstuffs has been studied in various Eastern countries, and publications have been issued summarising available knowledge. It would be useful, and quite feasible, to bring together all existing data on this subject, for publication by the League of Nations in a single volume. Such a work would be valuable in countries in which investigations in this field have not yet been initiated. There must be a general similarity in the common foods entering into the diets of Eastern countries, and experience shows that the nutritive value of any particular food is unlikely to vary much from place to place. At the same time, interesting differences *might* be brought to light ; it might appear, for example, that the variety of a certain foodstuff grown in Java is of higher nutritive value than another variety grown in Ceylon. Such information would be useful in connection with agricultural policy and nutrition.

It is advisable, however, that each country should undertake the analysis, etc., of indigenous foodstuffs.

Composition of the Diet.

Few satisfactory diet surveys have hitherto been carried out in the East. It must be emphasised that general accounts of dietary habits, based on casual questioning and observations, are of limited value. Satisfactory diet surveys involve the

weighing of each item of food consumed by sample families over a period of not less than a week, and preferably a longer period.

Mention has been made of dietary surveys carried out in India, which have yielded valuable information. It is proposed to extend this type of investigation to include the study of sample groups of village families in the different provinces, and for this purpose a special staff of field workers is being recruited and trained. Diet surveys and surveys of "state of nutrition" should be carried out simultaneously in the same area.

The Conference might recommend the carrying-out of detailed surveys of diet, correlated with surveys of state of nutrition, to obtain the necessary basic knowledge about the problem of malnutrition. Some suggestions about the conduct of such surveys might be made, notably with regard to the length of the period of study, the research personnel necessary, and the method of working up data. In India, village families may object to having their food weighed, and to overcome prejudice and suspicion and obtain satisfactory information it is necessary to work through agents on familiar terms with the people and trusted by them. A further difficulty in connection with family diet surveys in the East is that no really suitable "scale of family coefficients", based on precise knowledge, as yet exists. To establish a reasonably satisfactory scale of family coefficients, which might suitably be used in various Eastern countries, investigations of basal metabolism and food consumption in the various age and sex groups are necessary.

While emphasis must be placed on rural surveys, the importance of studying dietary habits in urban areas must not be overlooked.

ITEM 3.

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

To discover the minimum cost of an adequate dietary it is necessary to define an adequate dietary. The problem of establishing dietary standards has been discussed in a previous

section. If an adequate dietary is defined simply as “enough food”, then it is possible to relate cost and adequacy with fair accuracy. Study of the earnings, etc., of poor families in the East will probably reveal that they are often insufficient for the purchase of *enough* of the cheapest foods available to cover the calorie requirements of the family. Few attempts have been made to relate earnings and diet in this simple way, and investigations along these lines might produce useful information. It is noteworthy that, in fixing wage schedules, the relation between wages and diet is rarely considered.

A series of so-called “cheap well-balanced diets”, costing about Rs. 5 to Rs. 6 per adult per month, has been devised and studied in the Coonoor Laboratories. These diets were based on a fairly high standard as regards quality (*e.g.*, they included a fair quantity of milk), though, of course, they did not approach Western standards. Subsequently, it has been found that these cheap balanced diets are not cheap enough for purposes of practical nutrition work; they are beyond the means of the poor and of many residential institutions. A recent investigation was concerned with diet in residential homes for children in India. It was found that many children’s homes can afford to spend only Rs. 2 8 annas to Rs. 3 8 annas per child per month on food. At this level of expenditure, the diet *must* be based largely on rice or other cereals, whole milk cannot be supplied at all and other valuable foods—*e.g.*, vegetables and fruits—only in small quantities. Experience has taught us the difficulties of recommending improvements in diet in the circumstances. The point to be stressed here, however, is that a trained nutrition worker learns, as it were, to think simultaneously in terms of cost and quality. Having obtained information about the finances of a particular group, he can at once make deductions about the type of diet consumed.

It would be simple to relate the cost and quality of diets in various Eastern countries. Three types of diets might be drawn up : (a) a diet containing *enough* of the cheapest foods available to cover calorie requirements ; (b) a diet of slightly better quality, containing perhaps fair quantities of fish, pulses, vegetables, fruits, etc. ; (c) a diet of much better quality, resembling the cheap balanced diets devised in Coonoor. The

cost of these diets could readily be worked out and related to the income of population groups. This type of investigation might be suggested by the Conference as a useful preliminary to defining the problem of nutrition in the various countries.

“ Allowance for Food in Family Budgets.”

Diet Surveys and Economic Surveys.

It is desirable that studies of economic conditions should be conducted simultaneously with diet surveys ; such studies would, of course, include the question of “ allowance for food in family budgets ”. There are several advantages in carrying out economic and diet surveys of the same population groups. First, if a body of trained workers is carrying out investigations in the people’s homes, asking questions about income, indebtedness, live-stock owned, etc., they can, without a great deal of extra effort, collect data about food consumption. Secondly, the value of a diet survey is greatly enhanced if the results can be presented accompanied by a reasonably accurate account of economic conditions.

A survey carried out in South India revealed that the diet of a group of villagers was very deficient in quality and quantity. One wanted to know why. To say that a poor diet is a result of “ poverty ” is not very helpful. “ Poverty ” must be analysed. The following are among the questions which cannot be answered except by economic enquiry :

(a) Are the villagers poorly fed because their holdings are too small—*i.e.*, can their condition be related to population pressure ?

(b) Are they actually earning enough money to buy sufficient food but paying most of it away to creditors ?

(c) There are cows in the villages but practically no milk is drunk. Is this because all the milk is being sold, or because the cows are dry ? And, if they are dry, is it because there is no possibility of providing them with fodder or grazing land ?

(d) Why are more vegetables not grown ? Is it because there is no land or no water, or because the villagers are not interested in growing them ?

Such questions arise in the course of a rural diet survey.

Diet surveys are, of course, of value in themselves, but it is always advisable to collect simultaneously a certain amount of economic data. The Conference should make recommendations accordingly.

ITEM 4.

Diet and Health: Deficiency Disease.

Problems coming under these headings have been discussed in a preceding section. The study of “state of nutrition” in relation to diet is only just beginning in Eastern countries, and a great deal of spade work remains to be done. In India, systematic investigations of this subject are already in progress and will be extended. Among methods of study are the following :

Anthropometric Methods.

The simple collection and study of height-weight data may provide very valuable information. L. NICHOLLS’¹ analysis of the height-weight-age averages of Ceylonese children showed that height and weight are correlated with economic status and income (and hence with diet) and not with race. In India, investigations of height and weight are yielding very interesting data—in general, tending to the same conclusions. It has been observed, for example, that the average “weight for height” of children in residential institutions (usually fed on diets costing Rs. 3 to Rs. 4 per child per month) is greater than that of children of the same class in the general population, a fact which throws light on the “state of nutrition” of the latter. Another interesting observation may be briefly mentioned. In Travancore, South India, there are districts the inhabitants of which exist, for practical purposes, exclusively on tapioca. Now tapioca is a root and not a cereal, and its protein content is very low—1 to 1.5 gramme %. If a man lives on two pounds of tapioca a day, his daily protein intake will be about 13 grammes of protein, an amount far below that stated in the text-books to be necessary for life at all. These people do,

¹ *Ceylon Journal of Science*, April 1936, Vol. IV, Part I.

however, exist, in defiance of the science of dietetics, though at no very high level of physical development and vitality. Children in this area in the age-groups 7 to 14 are, on the average, 2 to 3 inches smaller than the average stunted Madrassi children. Few would disagree that a tapioca diet yielding about 13 grammes of protein daily is a deficient one.

The collection and analysis of height-weight data should be undertaken as an essential preliminary to the study of nutrition. Height and weight curves, based on adequate data, are required for infant welfare work, nutrition work in schools, etc.

The A.C.H. Index of Nutrition.

The A.C.H. index of some 4,000 school-children in South India has been determined. Some 25% were "selected" as malnourished. An association between "selection" by the index and the presence of signs of deficiency disease has been elicited, as is shown by the following table, which summarises the results of clinical examination and determination of the index in a group of children :

Number of children investigated	Per cent "selected" A.C.H.	Number showing clinical signs	Per cent of those "selected"	Number <i>not</i> showing clinical signs	Per cent of those "selected"
1,145	25.7	235	62.8	910	15.8

The A.C.H. index of nutrition does not, however, appear entirely suitable for routine work in India in its present form. There is a maladjustment between the set of measurements provided in the A.C.H. index (based on American children) and the physique of average South Indian children. It should, however, be possible, by the statistical treatment of abundant data, to "adjust" the A.C.H. index so that it can be used for routine work in schools in India. It is hoped to devise a modified index, including only three measurements instead of five, which will "select" a maximum number of children showing signs of deficiency disease. A detailed statistical investigation of this problem is in progress.

A study of the suitability of the original and “adjusted” A.C.H. index for routine work in schools in Eastern countries would be valuable. There are obvious advantages in an objective method of assessing the incidence of malnutrition which can be applied by comparatively untrained observers.

Clinical Methods.

The incidence of certain symptoms of food-deficiency disease—stomatitis, Bitot’s spots (xerophthalmia), and “phrynoderma” (follicular keratosis) among groups of school-children has been investigated in India.¹ All these are due to diet deficiency and can be cured by suitable dietary measures. Similar studies have been carried out by NICHOLLS in Ceylon and COTTER in Burma. For a full description of these symptoms, reference may be made to the series of papers by NICHOLLS and from the Coonoor Laboratories. The recording of this incidence is a valuable method of assessing the nutritional status of groups of school-children.

Teeth.

The incidence of caries and malocclusion requires investigation.

Physiological Tests.

Dynamometer tests of the strength of school-children have been carried out in India and correlated with various natures of “state of nutrition”. Further work in this field is in progress.

Reference has already been made to *hæmoglobin estimations* and *tests for vitamin C malnutrition*. The study of biochemical changes in the blood related to vitamin deficiency is yielding most interesting results in China. There is a promising field of research in the biochemical investigation of sub-clinical deficiency disease.

Basal Metabolism.

Quite insufficient data exist about basal metabolism in the various age-groups, and further work in various centres should be encouraged.

¹ AYKROYD and RAJAGOPAL, 1936 : *Ind. J. Med. Res.*, **24**, 2, page 419.

The Conference might select and recommend certain of these methods of studying “state of nutrition”. The assessment of “state of nutrition” must be correlated with data about dietary habits. A promising field of study is the association between malnutrition and certain diseases—*e.g.*, leprosy.

Basic knowledge about *average* anthropometric and physiological standards is lacking. The average represents what *is*, not what *should be*; but it is impossible even to define the problem of nutrition in the East until systematic observations on large population groups have been made.

Deficiency Diseases.

Little need be said on this subject, except to emphasise existing ignorance. Deficiency diseases which are recognised clinical entities—*e.g.*, beriberi, pregnancy anæmia—have been as yet insufficiently studied, and data about their frequency and geographical incidence are almost non-existent. Discussions with medical practitioners in touch with the poorer classes convince one that there are many obscure pathological states associated with diet deficiency which have not yet been systematically observed and recorded.

The Conference should *not* recommend specific studies of the more serious food-deficiency diseases. *The first essential is to collect basic information bearing on the problem of nutrition*, which will later assist in the understanding and control of such diseases.

ITEM 5.

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

Public Health Nutrition Work.

In India it is proposed to select and train a nutrition worker from each province, these workers to be attached to the various public health departments. Their function will include : the determination of height-weight-age averages in different social

groups, the detection of malnutrition in schools, the planning of institutional diets, the preparation of educational material, and the organisation of propaganda work in towns and villages.

The Conference might recommend the training of such workers in all the countries concerned. Close touch must be maintained between nutrition workers in public health departments and institutions for nutrition research. In small countries with a homogeneous population, it may be more convenient to have workers specialising in the practical aspects of nutrition directly attached to nutrition research laboratories and working in collaboration with public health departments.

Agriculture and Nutrition.

The aims of nutrition research, agricultural research and agricultural departments are essentially the same : to improve the food supply of the people. The findings of the nutrition worker can be given effect only through agriculture, and it is rational that these should be made the basis of agricultural policy.

As a result of the study of diet and nutrition in India, the following suggestions for the orientation of agricultural policy have been put forward :

(1) “ *The total available food supply may be insufficient to meet the quantitative requirements of the population. If this is so, the first and primary need is the production of enough food of whatever kind.*”

It is essential that the necessity of increasing total food supply should not be obscured by enthusiasm for improving the quality of the diet.

(2) “ *The spread of the use of milled rice should not be encouraged.*”

There is evidence suggesting that the “state of nutrition” of groups consuming milled rice is inferior to that of groups consuming home-pounded rice, millet or wheat. This statement would stand even if no regard were taken of the beriberi problem, the existence of which provides further evidence that a diet almost exclusively composed of milled rice is unsuited to human beings.

The "Rice Problem".

The question of making recommendations regarding milled rice requires very careful consideration by the Conference. It will be recalled that the efforts of the F.E.A.T.M. to bring about the introduction of regulations governing the distribution and sale of milled rice, based on a definition of "dangerous rice", proved unfruitful. Governments are chary of placing any checks on the marketing of a commodity of great commercial importance, and a satisfactory definition of "dangerous rice" is a matter of considerable difficulty. Further, it seems almost impossible to persuade populations consuming milled rice to discard it in favour of roughly milled varieties.

It is suggested, therefore, that the milled-rice question should be discussed along new lines. It would appear that the use of milled rice is continually spreading in rural areas, partly as a result of the construction of mechanical rice-mills, and that those who learn to prefer milled rice to home-pounded rice will not return to their earlier habit. Would it be possible to discourage—e.g., by suitable taxation—the establishment in rural areas of small mechanical rice-mills to which the cultivator takes his rice to save himself the trouble of "home-pounding" it, and where he can readily purchase the milled variety? There are obvious difficulties in following this course, but it is worth consideration. The importation of milled rice into rural areas (even into rice-growing areas) is also a factor in the situation not very susceptible to measures of control. In towns and cities, the use of milled rice is established; education and propaganda in favour of other varieties may be attempted, but it seems futile to expect very appreciable results. In the countryside it is a question of *preserving a healthy habit*.

On one point, the Conference should make a strong recommendation. Home-pounded rice is often obtainable with great difficulty or not at all in cities and country towns. It may be impossible to persuade adults to consume such rice, but children in institutions (and day-school children receiving free meals) can be made to do so. Steps should therefore be taken to ensure that supplies of unmilled or home-pounded rice are purchasable in towns and cities. The co-operation of the

rice trade might be enlisted in this matter. Even if the unmilled rice were slightly dearer than milled rice, it would be advantageous to have it easily available.

Definition of Rice.

Mr. Haynes, in his "Note on Rice-Milling", points out the present confusion with regard to terminology. For example, the term "polished" may be applied to milled rice which is actually polished to increase its commercial attractiveness by making it very white and glossy. It may also be used as a synonym for "milled". In the Coonoor Laboratories, this term is never used in the latter sense.

Rice which is not subjected to machine milling we call "home-pounded" rice. There is a genuine distinction, from a dietetic point of view, between this kind of rice and average machine-milled rice. On the other hand, there is less distinction between machine-milled rice which has been milled to a high degree of whiteness and machine-milled rice which has lost the germ and retains only a small proportion of pericarp.

From a dietetic point of view, the objective should be to encourage and retain the use of home-pounded rice, *or rice which retains as much or more of its integuments as typical home-pounded rice*. The importance of ensuring the availability of "under-milled" rice in towns and cities has been emphasised; the term "under-milled" should be given the above significance. Such rice may doubtless be obtained to some extent from the countryside; it may also be produced commercially as a small-scale product of the rice trade. A common-sense definition of this kind might suffice for practical purposes and obviate the difficulty of defining "dangerous rice" on the basis of chemical analysis, inspection, etc. Experience has shown that there are great difficulties in establishing a satisfactory definition based on a standard test.

In connection with the parboiled rice, one point should be borne in mind. It has been shown by the author¹ that parboiled rice retains vitamin B₁, on milling, even when the entire pericarp is removed. Milled parboiled rice therefore has a higher nutritive

¹ *Journal of Hygiene*, 1932, **32**, page 184.

value than milled raw rice, and the difference may be of great importance when there is a danger of beriberi. In certain circumstances, it may be desirable to encourage the use of milled parboiled rice in the place of milled raw rice.

(3) “*The most effective supplements to typical Indian dietaries are animal foods, such as milk, whole or skimmed, eggs, fish and meat.*”

This conclusion is based on experimental evidence. The fact that there are great difficulties in the way of an enhanced production of milk and eggs does not affect its validity. Fish is a valuable supplement to typical Oriental diets, and attention should be given to the development of fishing industries, as in Japan.

(4) “*Pulse production should be increased. A greater intake is desirable, but pulses are not equal in nutritive value to milk or eggs.*”

Again, this conclusion is founded on observations and experiment.

The soya bean does not appear to have any great advantage in nutritive value over other common pulses, and it is questionable whether it is worth while spending time and effort in popularising its production and consumption in countries in which it is not a familiar article of diet.

(5) “*Attempts should be made to increase the production of vegetables and fruits, which contain elements greatly needed by the population.*”

(6) “*Red-palm oil is a valuable, cheap source of carotene, the precursor of vitamin A. It could probably be produced in India.*”

The carotene content of red-palm oil is equivalent to the vitamin A content of a good sample of cod-liver oil. It has been found that medicinal preparations of red-palm oil are effective in the treatment of keratomalacia, and such preparations are much cheaper than cod-liver oil. There seems to be considerable possibilities in red-palm oil as a cheap source of vitamin A in Eastern countries. It might be widely used

medicinally (*e.g.*, in out-patient departments and dispensaries) and also as a dietary ingredient.

The above suggestions for the orientation of agricultural policy in India, based on nutrition research, are given for purposes of illustration. Nutritional and agricultural problems naturally vary from country to country. The advantages of co-ordinating agricultural and nutrition research are, however, self-evident. In India, a “liaison officer” between human nutrition research and agricultural research is shortly to be appointed. The function of the “liaison officer” will be to present to agricultural departments and research organisations the point of view of the expert on human nutrition. Whatever schemes for agricultural development are proposed or in progress, he will have to consider the question : “What bearing will such schemes have on human nutrition ?”

SUGGESTED BASIS FOR THE RECOMMENDATIONS OF THE CONFERENCE.

(1) The Conference might first of all emphasise the importance of the subject of nutrition, drawing the attention of Governments to the desirability of developing work in this field. It should be pointed out that at present the basic data required to define the problem are incomplete or lacking. The first necessity is *research*. A corollary to this is that more institutions for nutrition research and more trained workers are required.

(2) A plan of investigation, covering the subjects about which information is most urgently required, can be outlined. This plan of investigation might include :

(a) *Research on the nutritive value of foodstuffs.* — Suggestions may be made as regards the questions requiring study.

(b) *Study of the cost of diets of various quality in relation to income.*

(c) *Diet surveys.* — The technique to be followed can be outlined. The desirability of collecting economic and dietary data simultaneously may be stressed.

(d) *Investigations of "state of nutrition"* should be undertaken. Under this head should be included the systematic collection of anthropometric and clinical data, studies of basal metabolism, etc. A scheme of research can be drawn up.

(3) *Public health nutrition workers.* — The desirability that public health departments should include nutrition workers, and that nutrition work should be made an important part of public health activity, may be emphasised.

(4) The establishment of *close contact between agricultural departments and nutrition research organisations* should be recommended.

(5) The *rice problem* should be discussed and suitable recommendations made.

If work along these lines in various countries is to be initiated and encouraged, a *co-ordinating agency* is essential. A "Commission on Nutrition" could meet but rarely. It would be more valuable if a League of Nations worker, attached to the Eastern Bureau, Singapore, could be appointed to act as co-ordinating agent. Such a worker could fulfil a most valuable function.

In a year or two, when data have accumulated, a "Commission on Nutrition" might be convened, to consider the question of dietary standards, the establishment of a "Scale of Family Co-efficients", methods of combating malnutrition, etc. At present, a "Commission on Nutrition" could not do much to extend the findings and recommendations of the Nutrition Section of the Conference.

Appendix.

ASSESSMENT OF CALORIE REQUIREMENTS

The following is an attempt to estimate, in a rough and ready fashion, the minimum energy expenditure budget of a South Indian peasant. According to RAHMAN,¹ the average basal heat production per hour of a group of male students in Hyderabad was about sixty calories, some 7 to 8% below American standards. MASON and BENEDICT² recorded an

¹ *Indian Journal of Medical Research*, 1936, 24, page 173.

² *Ibid.*, 1931, 19, page 75.

average of forty-four calories per hour in fifty-four Indian women (students and teachers) in Madras—an average deviation from the Aub and Du Bois standards of minus 17.2%.

During sleep, the metabolism rate has been reckoned as 10% below the basal. Experiments on European and American subjects have shown that any form of manual labour raises metabolism at least three times above the basal, while "sitting at rest" raises it about 1.3 times.

Assuming that the basal metabolism rate of the average South Indian peasant is about sixty calories per hour, and that he spends eight hours of the twenty-four in sleep, eight hours at work, and eight hours "sitting at rest", his energy expenditure budget would work out as follows :

	Calories
8 hours sleep at 54 calories per hour	= 432
8 hours work at 180 calories per hour	= 1,440
8 hours "sitting at rest" at 86 calories per hour	= 688
Total	2,560

This seems a minimum budget, since expenditure at work is reckoned at the figure corresponding to expenditure in light manual occupations (*e.g.*, carpentry). No figures are available for the energy expenditure involved by agricultural labour, but, in general, it has been found that agricultural labourers in Europe and America have a high calorie intake. The item of 688 calories for eight hours "sitting at rest" seems also a minimum, since peasants do not occupy all the waking hours not spent at work in this fashion.

Reckoned on a similar basis, the daily energy expenditure of a woman with a basal metabolism per hour of forty-five calories would work out at 1,900 calories. No data exist about the basal metabolism of Indian children.

All things considered, it seems justifiable to estimate *minimum* daily calorie requirements per adult man or consumption unit in South India as lying in the neighbourhood of 2,500. It is sometimes assumed that, to cover a given energy *expenditure*, food consumed should have an energy value of 10 per unit in excess of that expenditure to allow for "waste". If it is reckoned that the daily food of a labourer should yield 2,500 calories, no allowance is made for "waste", a further argument in support of regarding this as an absolutely minimum figure.

If the diet of a labourer has a calorie value much lower than requirements as suggested, adjustment occurs as follows : basal metabolism is reduced, the body functioning, as it were, at a lower level of vitality, and energy output is made consonant with energy intake. In simple terms, the underfed labourer is lethargic, and his output of work is small. A level of food intake which permits only a languid existence cannot be described as normal.

3. A NOTE ON THE METHOD USED TO COMBAT RURAL MALARIA IN INDIA.

By

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No satisfactory general method of bringing malaria under rapid and effective control in rural areas at a cost within the means of the people has been evolved in any malarious country in the world. India is no exception to the rule, and, whilst there are many examples of successful control of malaria in municipalities and cantonments, and among labour forces employed on plantations, railways and other engineering works, and by various industrial concerns, we cannot point to any instance of the successful control of village malaria except at a prohibitive cost. For our present anti-malaria methods to be successful, it is essential for them to be carried out under constant skilled supervision. Moreover, they must be continued without relaxation from year to year, otherwise the reduction in communal immunity is likely to be followed by an increased malarial incidence when the control measures are withdrawn. Such a programme is only possible where the community concerned is comparatively wealthy, or is employed by a financially productive concern.

It is clear that, at the present time, it is not feasible to control malaria economically in the villages of India, in which 90% of the population of the country live, by any known method. It is thus inevitable that the efforts of the public health authorities of the different provinces have been directed mainly towards providing cheap treatment for the sick, a policy of amelioration rather than of control, and towards popularising the use of cinchona products by means of health education, propaganda and the free distribution of anti-malarial drugs in selected areas. There has been a notable increase in such efforts in recent years, and this has been stimulated by large gifts of quinine made by the Central Government.

THE MALARIA SURVEY OF INDIA.

The chief part played by the Malaria Survey of India in the advancement of malaria control has been the training of medical officers in all branches of malariology at the annual classes held at its Field Experimental Station, Karnal. Since the classes were recommenced in 1925 (after a lapse of eleven years during and after the great war), 222 medical men have attended the course, a large proportion of these being officers of the Health Departments of the various provinces. The course is essentially a practical one; it lasts for six weeks, and includes a large proportion of field work.

Experimental antilarval work has been carried out in selected villages, but the conclusion has been reached that the application of larvicides does not provide a practical solution to the problem of rural malaria. Future efforts will be directed towards a search for cheap, automatic, naturalistic methods, such as "herbage cover" or "sluicing". The ideal method, and possibly the only one with a real chance of success, would be one which would reduce malaria and at the same time improve the agricultural condition of the soil. Owing to the widely varying local conditions, it is not to be expected that any method will be evolved which will be suitable for use throughout India. Each province has its own problems, and different methods must be sought for to deal with them.

In addition to its functions of teaching and research, the Malaria Survey of India issues a number of bulletins dealing with malaria problems, which have a very wide circulation, and which are kept up to date by the frequent issue of revised editions. It acts as a bureau for providing information as to the latest methods of investigation and control, and for identifying the numerous specimens of mosquitoes which are sent in from every part of India. The services of the engineer to the Survey are also available for consultation. A hatchery of larvivorous fish (*Gambusia*) is maintained at Karnal, from which stocks are sent free of charge to malaria workers on application.

PUNJAB.

Malaria forecasts, based chiefly on the study of meteorological factors, are issued annually by the Punjab Epidemiological Bureau, immediately before the commencement of the malaria season. On the basis of this forecast, arrangements are made for the distribution of quinine and cinchona febrifuge in the areas where epidemic malaria is likely to be most severe. Thus, during the year ending March 31st, 1935, 1,088 lb. of quinine and 208 lb. of cinchona febrifuge were distributed in the province through 624 depots and 4,507 sub-depots organised for the purpose. In addition, propaganda was carried out by the public health staff in rural areas by means of lectures, posters and informal talks, and special efforts were made to popularise the use of mosquito-nets.

In connection with the general campaign for the improvement of sanitation in rural areas, 11,775 villages were visited by the public health staff and 534 sanitary committees were formed in villages. The construction of 161,012 feet of pukka drains was completed.

In addition to the scheme for the free distribution of quinine and cinchona febrifuge in rural areas through the agency of district medical officers of health, there is in operation a scheme for the sale of quinine treatments through post offices. There is also a scheme for the quininisation or cinchonisation of school-children.

Public Health Engineering.

(1) Broad land drainage is controlled by the Rural Sanitary Board, which includes the Chief Engineer, Irrigation Department, and the Director of Public Health. For practical purposes, this is an Anti-malarial Drainage Board, its chief functions being the opening-up of blocked natural drainages, the training and grading of natural drainages liable to cause flood by spill, and the control of irrigation depending on natural drainage. Blocked drainages and malarious areas are listed by the Director of Public Health and District Board authorities and referred to the Board for investigation. The area is surveyed by the engineer, a remedial scheme with an estimate of the cost is prepared, and,

when this is approved, it is submitted to a technical committee for sanction. The projects undertaken vary from river drainage against a discharge of 15,000 cusecs to the construction of storm-water drains from 100 to 200 miles in length.

(2) Municipal sanitary engineering is controlled by the Urban Sanitary Board, the secretary of which is the Director of Public Health. It deals with all classes of sanitary engineering, down to the provision of wells in villages, arrangement for fair areas and the treatment of villages which have no funds.

Rural development in the Punjab is chiefly a matter of Irrigation, and, whenever a new project is undertaken, the Public Health Department is called upon to advise. The Water-logging Board of the Punjab have laid down a set of principles to be observed in the preparation of canal projects and their execution, which are entirely admirable from the anti-malaria view point.

In addition to various great drainage projects, reclamation work is being carried out in a hyperendemic area of 3,000 acres, where the Irrigation Research Officer is experimenting with various methods of drainage with a view to reducing the subsoil-water level and to restore the fertility of the soil.

Canal irrigation has been reduced in the vicinity of towns and villages, and lift irrigation has been installed in several localities. Special attention is given to the removal of jungle growth and excessive vegetation from the vicinity of human habitations.

BENGAL.

An anti-malaria scheme for rural areas, consisting of the free distribution of quinine and plasmoquine, has been carried out in the Burdwan district since 1933. The area covered by this scheme is about 44 square miles, containing 100 villages, with a total population of about 21,000. Besides thirty treatment centres opened for this purpose, local volunteers have been engaged for each village to distribute combined tablets of quinine and plasmoquine to malaria patients. In 1934, a total of 9,275 cases were treated by doctors and 3,308 by the village volunteers. The expenditure on medicines within the experimental area was Rs. 3,600. It is reported that the fever

rate in the experimental area has been much reduced as compared with that in a neighbouring area where the scheme was not in operation.

Another scheme has been in operation for some years for free distribution of quinine in five intensely malarious thanas, each situated in a different district of Bengal. The agency for distribution of the quinine is through District and Union Board members, school-teachers and other specially selected residents, under the supervision of district health officers, sub-divisional officers and circle officers, and assistant directors of public health. In spite of the wide publicity given to this measure, however, the response from the rural public has been very poor, less than one-third of the amount of quinine allotted for the area having been consumed.

Besides the above two experiments, the Bengal Government has distributed large amounts of free quinine to all dispensaries and to rural areas through the district Boards.

The Public Health Department of Bengal has been carrying out malaria survey and control work in a number of villages near Calcutta during the past six years, where there have been many outbreaks of malaria due to the infiltration into this area of the salt-water breeding mosquito, *A. sundaius*.

As regards propaganda, there are twelve cinema parties which carry out general public health propaganda work in the province throughout the year, under the instructions of the district officers, giving cinema shows and lectures. One of the films shown deals with the prevention of malaria.

The Central Co-operative Anti-malaria Society is a non-official organisation founded for improving the sanitary condition of the villages of Bengal, and is supported by voluntary contributions. Its objects include the organisation of autonomous co-operative and public health societies throughout Bengal. It aims to act generally as an expert advisory body and guide to these public health societies, the total number of which now existing in Bengal is about 2,000. A feature of the work undertaken by these societies has been the removal of cross bunds in the village irrigation channels, and of the marginal bunds of rivers or creeks. The idea underlying this work is the restoration of the ancient irrigation system of Bengal advocated

by WILLCOCKS and BENTLEY, the decay of which has been held to be the greatest factor in the causation of malaria in Bengal. Other activities of the co-operative societies include the removal of vegetation from breeding-places, the filling or draining of disused tanks, and the encouragement of larvivorous fish.

The activities of the Birnagar Palli Mandali, a public health society formed in 1923, also deserved mention, though, strictly speaking, its work is confined to the prosecution of anti-malaria measures within the municipal jurisdiction of Birnagar. The work consists chiefly of the control of anopheline breeding and mass quininisation. Anti-larval measures include the clearing of vegetation from breeding-places and the application of oil and paris green. The work has been carried out with the co-operation of the Public Health Department of Bengal.

MADRAS.

A scheme for the distribution of quinine is in force in thirteen districts, in which sixty-five persons per mille received treatment in the year 1934 ; 1,385 lb. of quinine were distributed during that year among 108,296 persons. Free distribution of quinine is also practised wherever epidemics of malaria occur, at the discretion of the Director of Public Health.

Anti-malaria measures were carried out in 1934 in seven centres in the Vizagapatam Agency under Government auspices, including the application of paris green to breeding-places. The work was carried out in two cases under the direction of health inspectors, and in the remaining five under the direction of medical officers in charge of dispensaries. Anti-malaria measures were also carried out in Vizagapatam Municipality and in Rameswaram Island. In the latter case, work has been continuous over a number of years, and good results are claimed.

Revetment of the irrigation channels in Siriguppa has proved so successful in the reduction of malaria that the Government has been able to withdraw the special allowance granted to officials stationed in that locality on account of its unhealthiness.

Vigorous health propaganda is carried on throughout the province by means of cinema films, pamphlets, leaflets, posters and magic-lantern slides.

UNITED PROVINCES.

Extensive anti-malaria measures have been carried out at the headworks of the Sarda Canal, Banbassa, and the neighbourhood for a number of years. These include mass treatment with quinine, as well as antilarval measures.

In 1935, anti-larval measures were carried out in fifty villages in the Terai and Bhabar Estates, and a great deal of minor levelling and draining work was done ; 285 volunteers were trained for this work. The engineering staff of the estates also completed works at a cost of Rs. 10,000. Intensive mass treatment was practised in thirty-six villages in the vicinity of Bazpur and Shafakhana by two whole-time travelling compounders. 125 lb. of quinine, 132 lb. of cinchona and 4,985 tablets of plasmoquine were distributed free during the malaria season in certain villages not served by dispensaries.

Rural mass treatment schemes with cinchona and plasmoquine were carried out in certain village groups in the districts of Lucknow, Hardoi and Unao.

Quinine and cinchona are distributed free in villages where epidemic malaria breaks out. In 1935, 480 lb. of these drugs were distributed for the treatment of 101,921 persons.

Regular courses in malariology are given by the Malaria Department of the province to medical officers and sanitary inspectors. Anti-malaria work is also carried out through the agency of Boy Scouts and Junior Red Cross groups. In 1935, training was given in 160 centres, of which 127 were rural, to 10,874 boys. Their services were used for oiling, draining and filling-in of pools and ditches, and for the distribution of health notices.

(Colonel DUNN, in 1927, said that a scheme had been introduced for creating local anti-malaria societies for small groups of villages throughout the province, to which advice, literature and propaganda would be contributed by the Health Department.)

ASSAM.

As in other provinces, there is a scheme for the sale of quinine (or quinine-reinforced cinchona febrifuge) in the form of cheap

treatments, and both quinine and cinchona febrifuge are distributed free of cost in the most malarious areas.

A lump sum is provided annually by the Government (Rs. 24,500 in 1934), and the Provincial Malaria Committee holds meetings to consider the relative merits of schemes brought before it and to allot funds.

Magic-lantern demonstrations and lectures are given regularly in villages.

The Assam Medical Research Society has made investigations with a view to evolving the best methods of malaria control in Assam for several years. An important function of the society is the training of medical men in malariology. These include officers from the Public Health Department, Medical Department, tea estates, etc.

During the past year, two groups of villages, one in the Surma and one in the Brahmaputra Valley, were selected for the treatment of malaria cases with reinforced cinchona febrifuge, in order to popularise the treatment of malaria with these drugs. These schemes were financed jointly by the Local Board concerned and the Government of Assam.

Two groups of villages in the same valleys were also selected for experimental anti-larval control. The methods used were paris-green dusting, the use of booms to prevent larval drift from outside the controlled areas and the growing of densely shading trees and bushes over breeding-places. It is intended to extend these measures to other localities if they prove successful.

BIHAR AND ORISSA.

There appear to be no other measures for combating malaria in rural areas except the sale of short-treatment courses of quinine. In the report for 1934, it is stated that the amount purchased annually cannot be regarded as satisfactory ; 339 lb. of quinine sulphate were sold during that year.

CENTRAL PROVINCES.

Quinine is sold by vendors licensed by Tahsildars. All touring officers, school-teachers and postal authorities are required to

enquire into sales and make known the facilities for purchasing it to local inhabitants.

There is one travelling dispensary in the province.

Quinine is issued free in certain highly malarious areas.

NORTH-WEST FRONTIER PROVINCE.

There are no anti-malaria measures except such as are incidental to the campaigns carried out in cantonments, and the distribution of quinine to villagers. For the latter purpose, special compounders are employed in certain areas.

“ A more extensive and co-ordinated campaign is required throughout the province, but this can only be done when proper rural and public health staff have been provided ” (Public Health Report for 1935).

BOMBAY.

About fifty subordinate medical service officers are annually appointed by the Director of Public Health to visit villages in the most malarious parts of the presidency and to treat malaria cases.

Quinine to the value of about Rs. 50,000 is distributed free each year through the agency of officers of the Revenue, Educational, Forest and Public Health Departments. Quinine in the form of treatments worth about Rs. 20,000 is sold at two-thirds cost price by the Government. It is also sold at post offices cheaper than at the market rate.

Health propaganda is carried out by means of health weeks, at which lantern demonstrations and lectures are given.

Village improvement committees have been formed for most of the districts. Assistant Directors of Public Health attend meeting of these committees and help with their advice.

BURMA.

Out of the grant of 5 lakhs of rupees made in 1935 by the Government of India towards the improvement of local conditions, the local government included a scheme for the expenditure of Rs. 1,15,000 on anti-malaria measures. The chief

of these is the free issue of quinine. The free gift of 5,900 lb. of quinine received from the Government of India in 1935 has been converted into 4-grain tablets and is being distributed in rural areas. A sum of Rs. 25,000 from the Government of India rural uplift grant was set aside for the breeding and distribution of larvivorous fish.

Cinchona febrifuge tablets manufactured in jails are distributed to district treasuries for issue on payment (or free issue when authorised). Village headmen, vaccinators, postmasters and school-teachers are appointed as vendors by the Deputy Commissioners.

Intensive anti-malaria measures, including minor filling and draining works and the application of larvicides to breeding-places, have been carried out in and around Kyaukpyu, Akyab, Maymyo, Lashio, Rangoon, Sandoway and Sahmaw during 1935.

There has been a marked increase in health propaganda activities in recent years, including the exhibition of a Burmese adaptation of the Rockefeller malaria film.

DELHI PROVINCE.

In addition to the sale of cheap quinine treatments and the free distribution of quinine, anti-larval measures are carried out in certain villages.

A sum of 2 lakhs of rupees has recently been allotted by the Government of India for rural anti-malaria schemes extending over a period of five years, to be linked up with the anti-malaria campaign now being undertaken in the Delhi urban area.

MYSORE STATE.

Experimental malaria control work has been carried out for a number of years by the International Health Division of the Rockefeller Foundation, with the support and under the auspices of the Government of Mysore. The measures adopted have been the application of paris green to breeding-places, and mass treatment with quinine, plasmoquine and atebrian. At the present time, a new organisation is being tried, consisting

of one health officer in charge of six units of ten villages each. Each unit of ten villages has an inspector in charge, and each village has one field man who does paris-green dusting on breeding-places. Preliminary results have been encouraging, but it is as yet too early to assess the value of the scheme with accuracy.

Free distribution of quinine has been practised especially in the villages which have been rendered malarious by the operation of the Irwin Canal. Anti-larval measures with paris green have been carried out in certain of the worst affected villages.

A vigorous health propaganda campaign is in operation throughout the State, including the showing of a malaria film, lectures, posters and leaflets.

COORG.

During the past eight years, a considerable amount of anti-malaria work has been done in villages. In addition to free distribution of quinine and quiniisation of school-children, anti-larval measures (filling and draining and application of larvicides) are practised. A number of village anti-malaria societies have been formed, and these are carrying out anti-larval work and quinine distribution in rural areas.

Technical advice is given to the societies by the Malaria Officer of the province, who is also the secretary of the Coorg Malaria Committee.

Propaganda work is carried out by means of lectures, posters, etc.

WORK CARRIED OUT IN CONNECTION WITH RAILWAYS, PLANTATIONS AND OTHER INDUSTRIAL CONCERNS.

The account given above refers chiefly to efforts made to control malaria by the provincial Health Departments. The work alluded to in the present section is in progress in rural areas, and, though it does not concern village populations directly, it affects them by tending to popularise anti-malaria

treatment and is likely to lead to the evolution of measures suitable for general adoption in rural areas.

Special reference may be made to the control measures instituted by SENIOR WHITE on the Bengal-Nagpur Railway and by CHALAM on the Eastern Bengal Railway. The former has achieved notable results in protecting railway communities in malarious areas by means of drainage works and the application of larvicides, and more recently by the use of the "herbage cover" method evolved in Malaya.

The malaria problem in Assam has been clarified by the work of RAMSAY, of the Ross Institute, who has had strikingly good results on tea estates by the adoption of biological control methods, such as the growing of shade-giving trees and bushes over breeding-places, and the treatment of streams in narrow valleys by damming and sluicing.

4. RURAL PLAGUE IN INDIA.

By

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Plague in India does not now present the problem which it did in the earlier years of the pandemic.

The extent to which it has decreased since its introduction in 1896 is shown by the yearly average of deaths (in round figures) :

1898-1918	. . . . .	500,000
1921-1930	. . . . .	100,000
1931-1935	. . . . .	50,000

With this reduction in the incidence of plague, the disease has lost much of its former importance and does not now form a major preoccupation of the Public Health Departments of most provinces. Its importance is less than that of other epidemic diseases, such as cholera and smallpox. Occasional local outbreaks of some degree of severity still occur, and, in

some areas, endemic conditions may prevail for a period of years.

The reason for this decline is not certain. It cannot be attributed, certainly in rural areas, to any permanent improvements directed towards minimising the risk of epizootics. This would present great difficulty in a country of the size of India, and the conditions of housing, etc., as affecting rat prevalence are essentially the same as in the earlier years of the century.

Certain experimental work which has been carried out for a number of years suggests a possible factor in the reduction of plague incidence. It has been found in the course of testing the relative susceptibility to plague infection of rats from different parts of India, that these present a degree of immunity roughly proportionate to the prevalence of plague in past years in the area from which they have been obtained. Rats from places completely free from plague, such as Madras City, are highly susceptible, while those from places subject to frequent and severe epidemics resist considerable doses of *B. pestis*. This immunity may play a part in reducing the incidence and level of epizootics.

EPIDEMIOLOGY.

The epidemiology of plague was subjected to intensive study by the Plague Research Commission, and the main facts in regard to the conditions in the different provinces have been dealt with in the report of that body.

Plague in India is essentially bubonic plague. The pneumonic form rarely occurs. A few limited outbreaks have been observed, but there is little tendency for spread in this form. Plague pneumonia is a common complication of the bubonic and septicæmia forms, but in the Mahratta Plague Hospital, Bombay, where thousands of cases have been treated, and this complication was often observed, pneumonic spread has never occurred. The bubonic form is always due to flea infection from plague rats. The human case, as such, plays no part in direct spread. The habits of the people in India do not allow of any degree of human flea infestation, and direct spread from man to man is not a factor in India.

RODENT PLAGUE.

R. rattus (and its varieties) is distributed universally over India as a house-dwelling rat. *R. norvegicus* is found only in the seaports and has not spread elsewhere in India. The bandicoot and the lesser bandicoot are common in the larger towns, but their prevalence is low in comparison with *R. rattus* both in towns and rural areas. These rats, not being house-dwellers, play a lesser part in the epizootic so far as it may affect man. Field rats do not exist in the large numbers in which they are found in many other countries, such as Africa, America and Northern Asia. Large colonies of them do not exist, and it is possible that this may be attributable to the conditions of cultivation in India, the existence of numerous enemies, such as snakes and the mongoose, and to monsoon conditions. Field rats thus do not constitute a reservoir of infection of any importance in India. The conditions of housing in rural areas in India are such as permit of the existence of a very high rat population. This has been estimated as high as from one to two per head of population and in some areas may be even higher. The type of house construction commonly employed depends on the materials easily available locally. In a very large proportion of cases, houses are built of sun-dried mud bricks with wooden uprights and country tile roofs. Bamboo and thatch are also used to a lesser extent for roofing and corrugated iron is now employed to some extent. There are, of course, many other local types of structure employed.

The mud walls and floors so commonly used are ideal for burrowing by rats, and country tiles and many other types of roofing also afford shelter for rats.

It is the common practice in India for grain foods to be stored in houses, so that there is not only shelter available but suitable food as an attraction. These conditions make for almost universal high rat infestation. Even in the absence of conditions suitable for burrowing, the habits of the people and the methods employed in storing food and the collection of grain-bags, rubbish, etc., in houses provide ample shelter for rats. Under these conditions, with a large rat population in immediate contact with human beings, the introduction of plague infection

will result in an epizootic for which the conditions for spread are ideal and the risk of human infection is very high. The essential factor in rural plague in India is the *R. rattus* epizootic in houses.

THE FLEA TRANSMITTER.

As in most other countries in the tropics, *X. cheopis* plays the main part. This flea is found all over India. In Northern India and in the areas where plague has shown the highest epidemic levels, it forms the greater part of the rat-flea population. In Southern India, *X. astia*, which is at a lower level in the north, is the most prevalent rat-flea, *X. cheopis* being at a low level and in some parts practically absent. In limited areas of the south, a somewhat higher prevalence of *X. cheopis* has been found, and, in these areas, plague of mild epidemic and in some cases endemic form occurs. Where *X. cheopis* is absent or very scanty, the occurrence of plague has been negligible—for example, in the cities of Madras and Calcutta. In the Deccan plateau area, *X. braziliensis* is found on rats to a considerable extent, and in this area this flea is probably an important transmitter, as it is in areas of East Africa.

Numerous other species of fleas have been found on rats, but their occurrence is patchy and scanty and in no area do any other than those already mentioned appear to have any importance in the spread of plague.

CLIMATIC FACTORS.

Plague in India has always shown a definite seasonal incidence, which varies in different parts of India with climatic conditions. The factors concerned were studied by the Plague Research Commission, which has shown the relationship of plague to temperature and humidity in the different areas. Further studies on this point have been published from time to time. The limiting factors can be stated in general terms to be a rise of temperature above 80° F., combined with a saturation deficiency of more than 0.3 inch, at which level plague tends to die out ; but these factors operate in different areas in relation to total rat-flea prevalence and other influences. It is not possible

in this short note to define the effect of the various factors in the widely differing climatic conditions over the vast area of India.

The climatic factors probably work chiefly through their effect on (a) total flea prevalence, (b) length of life of the flea, and (c) the production of BACOT's "blocking" phenomenon in relation to these.

Recent studies have shown that the conditions in rat-burrows underground differ considerably from those that might be postulated from meteorological readings, and that the continuance of plague in mild epizootic form over the hot weather may result in carrying over infection into the next favourable season. This is specially so in places in which marked extremes do not occur.

Other factors which may result in maintenance of the epizootic and the carrying over of plague infection from season to season are (a) the period at which the infection occurs and (b) the size of the community. The former of these points was specially studied by KUNHARDT, who showed that, when villages were infected towards the end of the favourable season, the epizootic progressed only at a low level without exhaustion of the susceptible rat population, and that with the onset of more favourable conditions the epizootic flared up, and such a centre would be the source of maintenance of infection with subsequent spread to neighbouring areas. GREENWOOD, in an analysis of certain plague figures, showed that plague was much more likely to die out in small villages than in larger ones, probably from the fact that only one rat community was involved in the former case, while in larger villages the communities were more numerous.

PLAGUE PREVENTIVE MEASURES : POWERS TO DEAL WITH PLAGUE AND THE PROCEDURE ADOPTED.

Powers to deal with plague are conferred under the Epidemic Diseases Act of 1897, the local government issuing regulations under this Act from time to time. The regulations define the authority responsible for carrying out plague preventive measures and the statutory powers. The authority will ordinarily be the district magistrate. Powers are given to the plague

authority in regard to dealing with infected areas, markets, houses, etc., compulsory evacuation with provision of temporary accommodation, rat destruction, fumigation and other preventive measures and for the prevention of the introduction of infection.

The general lines of procedure may be illustrated by the practice adopted in Bombay Presidency, which is as follows :

The village headman reports the first outbreak to the revenue officer of the area, who deposes the nearest medical officer in charge of a dispensary to visit the village, to take preliminary measures and to make a report. In other cases, the civil surgeon of the district may be requested by telegram to depute a medical officer from his own staff. A report is made to the President of the local District Board, with recommendations as to further measures. If necessary, the civil officer in charge of the district and the civil surgeon may direct further steps, which may consist of the appointment of special plague medical officers for the area, provision of vaccine, ratting operations, provision for evacuation, etc. These measures are taken in consultation with the Director of Public Health, the Government assisting the local authority if necessary. In the Punjab, the plague preventive measures are carried out by the district medical officer of health with his sanitary staff supplemented by provincial staff if necessary.

1. *Measures of a Permanent Nature.*

It has not been possible under Indian conditions to carry out measures of a permanent nature for plague prevention in rural areas to any considerable extent. The present general campaign for rural uplift includes attempts at improvement of housing conditions ; but, specifically for reduction of the rat population, the measures of a permanent nature which have been taken have been applied only in limited endemic areas. Most provinces have prepared type plans of rat-proof grain stores, and these have been built in villages and small towns extensively engaged in grain traffic. In larger centres, these have been built to a much greater extent and are considered to be of high value. Some propaganda work by means of lectures, etc., is carried out.

Indian experience has shown that no permanent effective reduction in rat population is obtained by baiting and trapping and that this measure can only be of value if intensively applied in the presence of a threatened outbreak.

2. Measures of a Temporary Nature.

(a) During the Presence of an Outbreak of Plague.

When the report of an outbreak of plague in a rural area is made in accordance with the procedure already outlined, the measures ordinarily applied consist of :

- (1) Inoculation with Haffkine's plague vaccine ;
- (2) Evacuation ;
- (3) Rat-destruction methods ;
- (4) Disinfection ;
- (5) Control of ingress and egress from infected areas including control of grain traffic.

(1) *Anti-plague Inoculation.* — This is a method of plague prophylaxis which is relied on to the highest extent, and is the first method usually applied. Haffkine's plague vaccine has been in use in India since 1904.

A detailed account of the vaccine, the method of preparation, the results of experimental study, and the available statistics as to the results of its use has been published by TAYLOR (*Indian Journal of Medical Research*, Memoir No. 27). It is admitted that the conditions under which inoculation figures were collected are such as do not permit of exact statistical analysis being made on which it is possible to assert a particular degree of protection to be given, but the rough figures suggest a 4 to 1 protection against attack and an 8 to 1 protection against death. As the result of actual experience, however, public health authorities put a high degree of reliance on inoculation with the vaccine, and it is accepted as a valuable measure of personal prophylaxis and is applied in all outbreaks for the reduction of incidence and mortality.

Inoculation is the first measure employed in most cases, and in the presence of an outbreak it is usually accepted by a large

proportion of the population. Inoculation is not compulsory, but may be accepted when the alternative is compulsory evacuation of dwelling-houses.

Increasing value placed on inoculation is shown by the following figures giving the ratio of inoculations carried out in relation to plague deaths in Bombay Presidency.

1928	9.7:1	1932	17.1:1
1929	16.4:1	1933	22.8:1
1930	21.7:1	1934	20.8:1
1931	21.2:1	1935	35.7:1

The vaccine has been under further experimental study since 1932, when the memoir referred to was written. Alterations have been made in the details of manufacture, including the control of the virulence of strains used and other points, and with a particular technique in experimental animals it appears that the vaccine will now confer protection in a dose of one-thirtieth of that formerly required. This would suggest a considerable improvement in the prophylactic value of the vaccine. Attempts are being made to carry out a field trial of the vaccine in its present form by inoculation of human beings in an affected area under conditions in which statistical control will be possible, in order to assess more exactly its true value. The reduction in the incidence of plague has made it extremely difficult to select any area where an incidence of plague sufficient to provide figures of real comparative value can be obtained, and it has not so far been possible to conduct the trial.

For the purpose of field inoculation work, a standard box fitted with all the necessary equipment is used; 20 c.c. Roux pattern syringes, with spares, are supplied, along with a simple form of steriliser called the Kapadia lamp, in which the syringes are sterilised with vaseline at a temperature of 160° C.

Inoculations are carried out in the first instance in villages by the local dispensary or hospital staff, and later, if a more extensive inoculation campaign is necessary, additional staff is provided by the Public Health Department of the province or by the district health authority. Inoculators may be medically qualified staff or members of the sanitary staff specially trained in the work.

(2) *Evacuation.* — This is the oldest known anti-plague measure. A passage in the Bhagvat Purana, published perhaps a thousand years ago, advises people to vacate their houses “when rats fall from the roof above, jump about and die”.

Evacuation is practised in varying degree in different provinces and is considered specially suitable for small villages. It may be carried out voluntarily or under the orders of the district magistrate, who has power to enforce it if he considers it necessary, and provided he makes adequate arrangements for accommodation, water supply, security, etc. Evacuation may be applied to a whole village or to infected parts only of larger villages. Persons who have been inoculated with plague vaccine within nine months cannot be compulsorily evacuated. To be successful, evacuation must be to a sufficient distance, and there must be no traffic between the camp and the infected area as frequently happens by evacuated persons returning to collect food, etc., from their houses. During the period that an area is evacuated, the usual methods of rat and flea destruction are carried out in the houses. Inhabitants are permitted to return to their houses when there is no longer evidence of epizootic plague and when rats are no longer obtainable by trapping. Before their return, fumigation with cyanide preparations and spraying with kerosine-oil emulsion may be carried out.

(3) *Rat destruction methods.* — (a) *Trapping.* — Trapping has been found to be of limited value and it is not capable of bringing about a permanent reduction of the rat population. If carried out intensively for a short period when an epizootic is threatened or has commenced, it may reduce the rat population to a level which will minimise the epizootic. Experienced trained staff is required if effective results are to be obtained. The type of trap found most effective in India is the improved elongated wonder trap, which is suitable for *R. rattus* and *R. norvegicus*. Various types of box-traps and wire-traps are also used for these species and for bandicoots. The baits found most attractive vary in different localities; in general, the staple food-grain of the area is employed, while, in the hot weather, green vegetable, particularly cucumber, is useful. For a rat-trapping campaign, the number of traps provided may be about 3% of the population

and often trapping and poison-baiting are carried out on alternate days over a period of ten days. In other cases, an attempt is made to set traps in each house once a week. One trap for every two rooms is a common scale. Arrangements are made for inspection, repair and oiling of the traps and for the disposal of the rodents. Generally, the rats are drowned and the carcasses burnt.

(b) Poison-baiting. — As a result of experimental work in Poona, the poison now used is generally barium carbonate. One pound of barium carbonate mixed with three pounds of flour made from the local grain-food is made into a paste with water and divided into about 2,400 pills or baits each containing about 3 grains of the poison. This mixture should be freshly made daily.

Three groups of four baits each, on pieces of paper, may be considered sufficient for the average Indian room. Arrangements are made to check the baits each morning, to destroy unused baits and to dispose of dead rats. The procedure adopted varies in different cases. For example, trapping and baiting may be carried out on alternate nights for ten days. Again, baits may be laid for a few nights in succession. It must be noted that rats soon become bait-wily and it may be necessary to use different grains on successive nights to mix with the poison. Sometimes plain food baits of the flour to be used are laid for a few nights before poison baiting is commenced and the same procedure may be used if the rats become bait-wily to accustom the rats to the food. Arsenical poison-baits are sometimes used as an occasional alternative to barium carbonate, but phosphorus baits, although highly poisonous, appear to be unattractive to rats.

(c) Fumigation. — The earlier methods of fumigation employed generally made use of sulphur, and various local methods have been in use based on the action of SO_2 . Sulphur may be burnt in earthenware pots at the opening of the burrows and the fumes fanned or blown into the holes. In the Punjab, a convenient method of applying SO_2 has been in use in the form of "candles" called "Bhoosa battis". This often

consists of a mixture of chopped straw, red pepper and sulphur wrapped in an oily paper and provided with a gauze wick, which is lit and placed in the burrow. Such methods are now being replaced by methods in which cyanide gas preparations are applied.

Cyanide gas fumigation. — The use of preparations from which cyanide gas is released is becoming increasingly popular. The value of such preparations was submitted to an extensive field trial in an endemic area in South India over a period of four years (GEORGE and WEBSTER, *Indian Journal of Medical Research*, XX, 98, 1934), and, based on these and other experiences, instructions for the employment of cyanide preparation have been issued in *Health Bulletin* No. 21. Fumigation with cyanide preparations effectively carried out by expert gangs has yielded highly successful results in the prevention of plague, and is a measure which should be widely adopted.

(4) *Disinfection*. — Ordinary methods of disinfection in the sense of using a germicide are not applicable in plague, and the treatment of infected rooms, etc., which is carried out is directed towards the destruction of rat-fleas. For this purpose, it is essential that rooms dealt with should be first submitted to ordinary cleansing, with removal of all rubbish, before spraying is adopted. The pulicide spray employed in India has the following formula : Three parts of bar soap cut in slices and fifteen parts of water. Boil and dissolve. Stir in 100 parts of kerosene oil. For use, dilute with twenty parts of water.

Proprietary preparations, such as Pesterine or Flit, may be used.

(5) *Control of Movements*. — Legal powers are provided for the control of movements of grain traffic rather than of individuals. Power is given to close markets in infected areas or in places adjoining infected areas, and limits may be prescribed beyond which persons bringing articles for sale from or into infected areas may not pass. Along with this there is power to direct fumigation or disinfestation by other methods of grain or merchandise conveyed by rail or otherwise.

(b) *In Inter-epidemic Periods.*

Special measures are carried out in areas where plague tends to become endemic. These consist chiefly of methods directed towards the reduction of the rat population in selected areas where plague occurs in successive years. The methods chiefly employed are fumigation, including the use of cyanide preparations, trapping and poison-baiting. At the same time, attempts are made in such areas to encourage improvements in housing conditions, to introduce rat-proof grain godowns and the use of rat-proof receptacles for the domestic storage of grain. These measures are also applied during the periods and in the villages in which there appears to be a risk of "carry over" infection.

Propaganda by means of lantern and cinema demonstrations, lectures and rural broadcasts is increasingly being made use of.

5. HOOKWORM INFECTION IN INDIA.

Although hookworm infection in man was apparently first reported from India as early as 1879, published references to its incidence, and more especially to its intensity, are still inadequate for the greater part of the country. Much careful and detailed work has been reported upon, and much more undoubtedly still lies in Government files; but in large tracts the problem seems to have aroused little or no research interest, although estimates as to average incidence of the infection over the whole country vary from about 40 to as high as 70 or 80%. It would probably be a safe estimate to say that about 210,000,000 people in India have this infection, but no estimate of the proportion of those who may suffer from the classical symptoms of hookworm disease is possible. The professional attitude towards the infection has varied from regarding it in the early days as a medical curiosity, through an over-estimate of its importance as a devastating disease, to a more scientific acceptance of the fairly established fact that, although the incidence is widespread, the average intensity of the infection,

even in the worst parts of India, is low as compared to the average worm burden of the populations of such places as Porto Rico, the countries of Central America, and parts of China.

EPIDEMIOLOGICAL FACTORS.

Soil pollution may be said to be practically universal among India's predominantly rural population, nor are conditions much better in many of the larger towns. Night-soil, however, is rarely used as a fertiliser, so this point does not play the more important rôle it bears in China. In spite of the widespread soil-pollution habit, the incidence and intensity of hookworm infection is not uniform, a fact which must have its explanation in the great variation over India in average annual and monthly rainfalls. Not only is hookworm intensity heaviest in areas with the highest annual rainfall, but its incidence also seems to vary with the number of months in the year in which over five to six inches of rain are the average. The areas so far reported to have the heaviest intensity of infection lie in parts of Burma, Assam and Bengal, and along the east and west coasts of India, all areas with a high rainfall. In addition, certain local areas, such as the South India planting-area, have higher intensities, due partly to their rather local high rainfall. Further detailed local surveys would undoubtedly add to the number of such small areas.

Since adequate latrines, the wearing of shoes and similar preventive factors are largely urban habits in India, occupation does not play the rôle in hookworm infection which might be expected of it. Estate coolies seem usually to have a high intensity of infection, although this is in all probability due to the location of tea, rubber and other estates in areas of high rainfall and to the concentration of population, with its consequent soil-pollution, in smaller areas than is usual with the ordinary villager of such areas. Hookworm is present in miners in India and is a moderate risk consequent on this occupation. About the only other occupation reported in India as exposed to risk of heavy infection is that of the coolies engaged in collecting and disposing of night-soil in cities and towns.

Sex plays little part in the epidemiology of hookworm infection in India, although there are indications from some parts that females may be more heavily infected than males, due, probably, to different defæcation habits. There is also evidence of increasing infection with age, but children are infected early in life; an approximate adult infection would seem to be acquired by the age of about 15.

So far as is known, agricultural irrigation has as yet played little part in increasing hookworm infection in India, but this supposition may be changed by further more detailed studies. The character of the soil plays an important part in hookworm epidemiology and an explanation of light infections in areas of adequate rainfall in India may be this as yet unstudied factor.

SPECIES OF HOOKWORMS.

There is little information about the species of hookworms to be found in India, but, in general, it may be stated that *N. americanus* predominates in South and East India and that it is gradually displaced by *A. duodenale* as one goes towards North-West India. In an extensive survey of the Madras Presidency, it was reported that 7.9% of the worms recovered were of the species of *A. duodenale*. Reports from Bengal indicate an incidence of about 27% for this species, and it is reported as the predominant species in Bihar and north-westward.

INCIDENCE AND INTENSITY OF INFECTION.

In general, it may be said that the incidence of hookworm infection is high throughout India, with the exception of most of the Central Deccan, and the dry portions of Rajputana, the Sind, the Punjab and the North-West Frontier Province. Intensities of infection are low, as compared with many other countries, but are heaviest in parts of Assam, Bengal and the east and west coasts of South India. Detailed information cannot be included here, but an attempt will be made to cover the general knowledge available for the important political and the geographical divisions of India. In giving the information

as to incidence, figures will be given in percentage infected and figures for intensity, where available, in number of eggs per cubic centimetre, *basis formed stools*.

South India.

The incidence of hookworm infection in South India covers a wide range, varying from a district average of 12.2% in the Bellary District and 14.5 in the Chitaldrug District of Mysore State up through percentages of 20, 30, 40, 60 and 80 to incidences of over 90% of the population in the Salem, South Arcot, Trichinopoly and Tinnevely Districts and in Travancore and Cochin States. The intensity of infection varies from this somewhat, since the highest average intensities are on the north-east Madras coast. The average number of eggs per cubic centimetre in the Ganjam and Vizagapatam Districts of this coast is 2,700, while the average in the Malabar District and Cochin State on the west coast are 1,800 and 2,000 respectively. Infection intensity dies out irregularly to figures well below 600 eggs per cubic centimetre in the central and northern districts; these low figures are probably also true for Hyderabad State and on up into Central India.

Western India.

There is little information as to hookworm infection in the Bombay Presidency and the Deccan, but it seems probable that the latter is practically free of the infection and that only the coastal strip of the Presidency south of Bombay has any infection comparable to the moderately infected parts of South India. Kathiawar and Gujerat may have a moderate incidence of infection, but the intensity is in all probability very low.

North-West India.

The Punjab, Sind, Rajputana and the North-West Frontier Province are probably practically free of infection, but there may be an incidence of about 70% and 980 eggs per cubic

centimetre intensity along the eastern and northern boundaries of the Punjab. Such an average infection is reported for a village near Simla and figures of 82% and 846 eggs per cubic centimetre for an area near Ambala.

North-Central India.

Hookworm infection would seem to be heaviest in the United Provinces in the northern and eastern districts and in the eastern districts of the Central Provinces, the incidence varying from under 10 to over 80%. The intensity correspondingly varies with average counts as low as 8 eggs per cubic centimetre, rising to averages of 1,600 eggs per cubic centimetre.

Bihar and Orissa.

In Bihar and Orissa, the incidence of hookworm infection is widespread, reported figures varying between 50 and 100%, but the intensity is low, averages being 140 and 800 eggs per cubic centimetre. When it is remembered that *A. duodenale* is reported to be the predominant species, the average worm burden of the people of these provinces is undoubtedly small.

Assam and Bengal.

Hookworm incidence is widespread in Assam and Bengal, varying between a reported incidence of about 21% in the Sunderbands of Bengal to a 60 to 99% incidence over the greater part of these two provinces. Intensity of infection varies between 100 and 1,200 eggs per cubic centimetre in the village population of Bengal and between 140 and 1,800 eggs per cubic centimetre in Assam, the latter province having the more severe infection and having a heavier worm burden amongst its valley population than that found in the hill tribes. The heaviest infections found in India occur in the estate coolies of the planting areas of Bengal and Assam, averages being upwards of 3,000 eggs per cubic centimetre, in spite of long years of control work on many estates.

HOOKWORM INFECTION AS A PUBLIC HEALTH PROBLEM IN INDIA AND ITS CONTROL.

Much more work, and more detailed work, will be necessary before the published knowledge of hookworm infection in India may be considered as at all complete. From what is now available, however, it would seem safe to assume that, aside from portions of Assam, Bengal, the Himalayan foothills, the eastern and western coasts and certain estate areas, hookworm infection cannot be considered to be of great importance as a public health problem. Whatever views may be held as to the effect of small numbers of hookworms on the health of the persons concerned, questions of emphasis and expense would undoubtedly remove the hookworm problem from immediate public health consideration over the greater part of India. Treatment in hospitals and dispensaries of the more obviously infected and gradually advancing home and environmental sanitation may safely be left to deal with the situation in the lightly infected parts of the country.

In the remaining parts of India, the action to be taken must largely depend on local studies of the urgency of the problem, although over the greater part of this more heavily infected area routine treatment of all patients at hospitals and dispensaries would undoubtedly result in improvement of existing conditions. Where intensive public health work is being attempted, periodic treatment of the population, preceded by individual examination in the more highly infected areas and by the provision of adequate household latrines in all areas, can be depended upon to reduce the infection to negligible proportions.

Aggregations of labour such as are found on estates, mines and the like present a different problem. Here, periodic wholesale treatment, routine admission and periodic examinations, the provision of latrines with education in, and enforcement of, their use should be practically compulsory. In no such situation in India have consistent and persistent efforts been made to carry out an adequate programme of control.

From the information available, it would appear that the Indian labourer is more of a menace to his own country upon

return from abroad than he is to the already infected country to which he goes. Not only should the existing arrangements for treatment of outgoing labourers be more generally enforced, but those returning should be put through the same routine treatment.

As has been amply demonstrated in many places, the provision of latrines is a corner-stone in the control of hookworm infection without which little progress can be made, and it is becoming more evident that public latrines are as a rule not adequate for this purpose. On the scores of expense, utility, safety and general adaptability, the bore-hole latrine would seem to be the best type to adopt, in areas where the soil is suitable, as a household latrine.

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6. TUBERCULOSIS IN RURAL AREAS.

A. NOTE BY DR. A. C. UKIL.

The distribution of infection and disease in India presents a complex problem, as the picture varies in different areas from the almost virgin rural and far-away places to highly urbanised

and industrialised centres. Tuberculous infection, though increasing in recent years owing to increasing urbanisation, industrialisation and the introduction of rapid transport facilities, is not yet so widespread in India to-day as in Europe and America. The infection rate in India is yet only half of that in European countries, and it varies from 21% in rural to 76% in urban and industrial areas. Some workers hold that the extent of tubercularisation of the population in India to-day is midway between that of the virgin African races and the highly urbanised and industrialised European races and that India perhaps stands in this regard on the same level as China. The urban population in India varies between 7 to 20%, according to different regions, as compared with 80% in England and Wales, 52% in the United States of America and 53.7% in Canada. The mingling of rural populations which are much less bacillised and of virgin races like the Gurkhas, Bheels, Khonds and Khasias, with a small proportion of people of highly tubercularised areas, presents a complex picture of hypersensitivity and resistance among the infected people. The smaller towns and industrial centres serve very often as the meeting-ground for the diffusion of infection and disease. People who migrate from rural areas into cities and industrial areas, particularly students, women, children, menials and labourers, usually show a low incidence of infection. When they are attacked with the disease, they show an acuter onset and present a more exudative infiltration than the urban people, and the death rate, consequently, is also high among them. Recent investigations indicate that tuberculosis accounts for a large amount of mortality among infants and children in tubercular homes, but no definite figures are available for the whole of India. The disease among adults in rural areas shows an acuter onset and proves more rapidly fatal than in Europe generally. The rapid transport facilities gradually being introduced into India are, undoubtedly, helping in the diffusion of cases into rural areas from cities and industrial centres.

It is very difficult to say with any degree of exactitude what is the morbidity and mortality rate from tuberculosis in rural areas, as there is no accurate method of registration in rural areas and as the disease is not yet notifiable, excepting in

certain municipal areas. Hence we have got to form an estimate from the total recorded deaths, to which must be added a certain fraction of deaths from fever, respiratory diseases and infantile mortality. It is variously estimated that 10 to 20% of deaths from fever are really due to pulmonary tuberculosis and that 20% of the deaths entered as due to respiratory diseases are actually due to pulmonary tuberculosis. The recent figures indicate that tuberculosis is rampant in urban and industrial centres and that it is diffusing into rural areas. As an example, it might be cited that the Darjeeling District, which is not at all industrialised and is chiefly rural, stands only second to Calcutta as regards mortality from this disease in the Province of Bengal. The urban death rate is in many cases higher than that of European towns. The rural death rate, as appears from the present records, varies from half to one-third of the urban death rate. It is believed that the peak of the epidemic of tuberculosis was reached in England as far back as 1830 and in Japan as far back as 1910. India seems to be on the ascending curve of the peak at present ; but it is difficult to say with precision as to when the highest point will be reached, as this will depend on the rate of urbanisation and industrialisation and consequent diffusion of tuberculosis throughout the country.

REGISTRATION.

The health authorities have got to depend on the village Chowkidars for this purpose. Naturally, registration is very defective and unreliable for statistical purposes.

NOTIFICATION.

The disease has been declared to be notifiable by medical men or by guardians only in municipal areas in certain provinces. It has not yet been made notifiable in rural areas. Neither has it been entered in the category of infectious diseases.

HOUSING CONDITIONS.

Although the houses are well insulated in rural areas, the conditions of living within the household favour a very large

spread of the disease ; for example, the joint family system, promiscuous spitting, eating and drinking from the same vessel, sleeping on the same bed, Purdah system, early marriage and motherhood, all tend to favour dissemination of the disease within the household, and in 50% of the cases a history of contact with another case in the family has been found by workers on tuberculosis. Therefore, tuberculosis spreads chiefly from man to man in the rural areas also. Bovine infection is still a rare occurrence in this country, partly because there is a very small proportion of cattle infected with bovine tuberculosis, and because people invariably boil the milk before they drink it. The result of typing out tubercle bacilli from non-pulmonary sources, carried out at Bombay and Calcutta, has hitherto supported this proposition.

MEDICAL ARRANGEMENTS IN RURAL AREAS.

The total number of beds for the tuberculous in India does not exceed 1,500. This number must be considered to be very small when we remember that the number of deaths from tuberculosis in India is near about 600,000 a year.

HEALTH SERVICE IN RURAL DISTRICTS.

Special tuberculosis service, either for cure or for prevention, has not yet been instituted either in rural or in urban areas ; but a number of bigger towns have now started tuberculosis dispensaries with the help of trained tuberculosis health visitors and doctors.

CO-OPERATION WITH PRIVATE HEALTH AGENCIES.

Tuberculosis associations, as voluntary organisations or subsidised by the State or Red Cross Society, have been started in a number of provinces. They are trying to open out clinics for the detection and relief of the tuberculous, but no definite State organisation yet exists in this direction. The King George Thanksgiving (Anti-Tuberculosis) Fund, started by the Red Cross Society, is carrying on educative propaganda in the different provinces and is trying to co-ordinate the activities of various tuberculosis organisations in India.



B. NOTE BY DR. A. R. MEHTA, M.B., D.P.H., ORGANISING
SECRETARY, KING GEORGE THANKSGIVING
(ANTI-TUBERCULOSIS) FUND.

The epidemic character of tuberculosis is undoubted, though in contrast with the more acute infections it manifests itself in comparatively slow-moving cycles, sometimes through several generations or across a series of communities. But it still follows the same general course—widespread at times, common to particular localities or among certain groups, moves wave-like with definite rises when it comes across virgin soil and gradually declines as resistance is evolved and flares up again where contact has been lost. At present, the disease exists in epidemic form, as has been shown from surveys and death verifications in urban areas.

Although no accurate figures can be produced for rural areas, the widespread dissemination of tuberculosis is common knowledge. Various factors are responsible for this spread. The rural population is more or less a "virgin soil". Overcrowding, low standards of living and sanitation and lowered resistance to disease make it easy for infection to spread. Improvement in the means of communication has played a considerable part, whilst recruitment of labour from rural areas has in certain areas been an important cause, as the labourers seldom break away permanently from their villages and return home periodically from the industrialised areas, bringing infection with them.

The King George Thanksgiving (Anti-Tuberculosis) Fund has attempted to arouse the public conscience through an educative and propaganda campaign and has not neglected work amongst the rural population. Large numbers of rural dispensaries have been provided with propaganda literature and picture posters. Special efforts have also been made to reach the rural areas by means of a cinema lorry; the films shown are accompanied by a running commentary made by a trained lecturer. The tuberculosis film produced locally recalls an Indian story, has an Indian cast and has Urdu and Hindi captions. Copies of this film with vernacular titles suitable for

other provinces have also been prepared. The fund also provides facilities for the training of medical practitioners in the diagnosis, prevention, treatment and control of tuberculosis.

7. LEPROSY AND ANTI-LEPROSY WORK IN INDIA.

By

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I. INTRODUCTION.

It is impossible to discuss the rural aspect of leprosy work without dealing first with the general aspect of the leprosy problem as it is seen in India and without giving some details of the part in anti-leprosy work which is taken by different agencies.

Although anti-leprosy work is in its infancy, owing to the recent increased public interest in the problem, and owing largely to the formation and work of the Indian Council of the British Empire Leprosy Relief Association, during the last ten years much has been done and much experience gained, which will be of use in the future.

2. THE DIFFICULTIES OF ANTI-LEPROSY WORK IN INDIA.

India is a vast country with a population of about 375,000,000, mostly living in villages in poverty and in unhygienic surroundings and consisting of different races with different languages, diets and customs. In addition to the difficulties which are encountered in any densely populated tropical country, two important factors exist. The first is religious sentiment, which regards leprosy, not as an infectious disease, but as a visitation of the gods, a fate which cannot be avoided. The religious sentiment which encourages the giving of alms to beggars as a religious duty results in lepers travelling all over India, particularly to centres of religious pilgrimage. The second factor is the "joint-family system", under which

a father, mother, married sons and their families and all unmarried children share one household. If any member of the family gets leprosy in an infectious form, all other members are exposed to infection, and many of the children contract the disease in this way.

3. THE INCIDENCE AND DISTRIBUTION OF LEPROSY IN INDIA.

According to the 1931 census, the incidence of leprosy in the various parts of India was as shown in the following table :

Distribution of Lepers by Provinces and States (1931).

Province, State or Agency	Population	Persons	Males	Females	Rate per 100,000
India : Total	352,837,778	147,911	107,892	40,019	42
Provinces : Total	271,526,933	126,867	93,281	33,586	46
Ajmer-Merwara	560,292	18	12	6	3
Andaman and Nicobar Islands	29,463	2	1	1	7
Assam	8,622,251	5,164	3,864	1,300	59
Baluchistan (districts and administered territories)	463,508	24	20	4	6
Bengal	50,114,002	20,845	15,290	5,555	42
Bihar and Orissa	37,677,576	19,329	14,408	4,921	54
(a) Bihar	25,727,500	9,457	7,614	1,843	37
(b) Orissa	5,306,142	5,924	4,328	1,596	111
(c) Chota Nagpur	6,643,934	3,948	2,466	1,482	59
Bombay : Total	21,930,601	9,112	6,374	2,738	41
(a) Bombay Pres	17,992,053	8,808	6,150	2,658	49
(b) Sind	3,887,070	277	197	80	7
(c) Aden	51,478	27	27	—	52
Burma	14,667,146	11,127	7,607	3,520	76
Central Provinces and Berar : Total	15,507,723	11,506	7,341	4,165	70
(a) Central Provinces	12,065,885	7,344	4,415	2,929	61
(b) Berar	3,441,838	4,162	2,929	1,236	121
Coorg	163,327	17	11	6	10

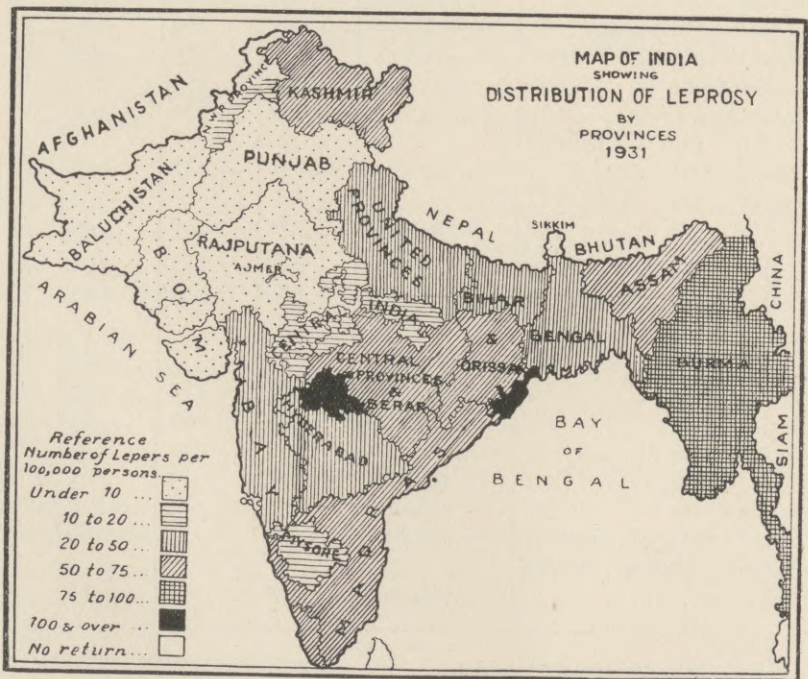
Distribution of Lepers by Provinces and States (1931) (continued).

Province, State or Agency	Population	Persons	Males	Females	Rate per 100,000
Delhi	636,246	9	8	1	1
Madras	46,740,107	33,127	24,842	8,285	71
North-West Frontier Province (districts and administered territories)	2,425,076	249	164	85	10
Punjab	23,580,852	1,853	1,326	527	10
United Provinces of Agra and Oudh : Total . .	48,408,763	14,485	12,013	2,472	30
(a) Agra	35,613,784	9,182	7,453	1,729	26
(b) Oudh	12,794,979	5,303	4,516	743	42
States and Agencies : Total	81,310,845	21,044	14,611	6,433	25
Assam States.	625,606	256	168	88	40
Baluchistan States . . .	405,109	27	21	6	6
Baroda State	2,443,007	575	393	182	24
Bengal States	973,336	409	316	93	45
Bihar and Orissa States .	4,652,007	3,465	2,240	1,225	75
Bombay States	4,468,396	1,649	1,161	488	37
Central India Agency . .	6,632,790	1,084	760	324	16
Central Provinces States	2,483,214	1,013	610	403	42
Gwalior State	3,523,070	425	272	153	12
Hyderabad State	14,436,148	3,738	2,630	1,108	26
Jammu and Kashmir State	3,646,243	2,026	1,381	645	62
Madras State Agency : Total	6,754,484	3,728	2,739	989	55
(a) Cochin State . . .	1,205,016	745	553	192	62
(b) Travancore State . .	5,095,973	2,789	2,037	752	55
(c) Other Madras States.	453,495	194	149	45	48
Mysore State	6,557,302	733	536	197	11
Punjab States	437,787	227	162	65	56
Punjab State Agency . .	4,472,218	687	491	196	15
Rajputana Agency . . .	11,225,712	543	382	161	5
Sikkim State	109,808	7	5	2	6
United Provinces States .	1,206,070	304	235	69	25
Western India States Agency	3,999,250	148	109	39	4

Male lepers per 100,000 : 59.3

Female lepers per 100,000 : 23

The geographical distribution of leprosy in India according to the 1931 census is shown in the map. More recent survey work has shown that the true figure for leprosy in any given area may be from three to twenty times higher than the census figure. On this basis, it is estimated that the number of cases of leprosy in India is at least one million, the average incidence being at least 0.3%. In many areas, however, the incidence is much higher. Reference to the map will show that leprosy is most common in the southern and eastern areas and in certain of the Himalayan valleys. In Central India, the incidence is lower and in the north-west is lower still. In certain large parts of southern and eastern India, the incidence is often 2 to 3% of the population. In smaller areas or groups of villages, the incidence may be 5 or 7%; in isolated villages, it may be 10 or 20%.



(a) *Incidence in relation to Race, Climate, Diet and Hygienic Condition.*

Attempts have been made to correlate incidence of leprosy in various parts of India with race, climate, diet and social and hygienic conditions. All these factors may be of importance, but it is difficult to assess separately their importance.

The virile races of the north-west consume a good diet and show less leprosy than the less virile races of the south and east, whose diet is relatively poor. A dry climate, hot in summer and cold in winter, is associated in India with a low incidence, but such areas are inhabited mainly by the more virile, well-nourished races. Leprosy is commoner in the more equable climate of the south and east, but these areas are inhabited by the less virile races, eating a relatively poor diet. Leprosy is, on the whole, a disease of bad social and hygienic conditions and of poverty, but cases are found where these conditions are absent and in the Madras Presidency, which is probably the most advanced province in respect of social and hygienic conditions, the incidence of leprosy is very high.

(b) *Leprosy in Rural and Urban Areas.*

Leprosy has, until recent years, been chiefly a rural problem, but the development of roads and railways, and the establishment of large industrial communities recruited mainly from rural villages, have introduced a new factor. The healthy rural workers migrate to the industrial centres with their families, get infected with leprosy and later return and spread the disease. Most cases seen in India are of a relatively mild neural or neuro-macular type. Many slight cases are seen in which the disease does not progress to the severer form. As most workers regard the macular or neuro-macular types as non-infectious, of the one million cases in India, at any one time about three or four hundred thousand are infectious. Although isolation of such cases is regarded as the most important measure for control of the disease, it is impossible in India to attempt to isolate such large numbers.

4. ANTI-LEPROSY WORK.

All anti-leprosy work is on a voluntary basis. The large numbers of cases, the few leprosy institutions, the limited financial resources and the lack of public opinion make it meantime impossible to attempt to deal with the problem on the basis of legislation and compulsion.

Under the Leper Act, it is possible to secure the compulsory removal of indigent lepers to institutions, and provisions also exist for the prevention of lepers following certain occupations. For many reasons, it has been found difficult to apply the provisions of this Act.

Agencies interested in anti-leprosy work include provincial governments, local district authorities, Christian missions (particularly the Mission to Lepers) and the Indian Council of the British Empire Leprosy Relief Association. These often work in collaboration.

The only body working on an all-India basis is the Indian Council of the British Empire Leprosy Relief Association, which has an annual income from endowment of about Rs. 100,000 a year. Branches of the association exist in most provinces. The Council maintains a Leprosy Research Department and training-centre in Calcutta and a Leprosy Propaganda Officer, who tours throughout India, whilst the Council prepares suitable propaganda material in different languages and publishes a quarterly journal in English. In addition, grants are made to provincial branches which organise work in collaboration with and in addition to that done by provincial governments and local authorities.

Anti-leprosy work in the provinces is of various kinds and includes surveys, propaganda, leprosy clinics, isolation camps and leprosaria.

A province, it should be remembered, is an area comparable in population to that of England. In addition to seventeen provinces, there exist many native States, large and small. In some provinces is to be found a leprosy officer, appointed sometimes by the provincial government and sometimes by the provincial branch of the Leprosy Association. This officer visits the different parts of the province, assisting in and

encouraging the development of anti-leprosy work. In some provinces, district anti-leprosy organisations and sometimes district leprosy officers are now at work.

(a) *Leprosy Survey Work.*

Three types of survey have been undertaken. The first is made with the object of getting a rough idea of the incidence and distribution of leprosy in a large area. This is usually done by a small special staff, which carries out sample surveys of groups of villages (both in parts reputed to be highly infected and in others where the disease is said to be comparatively rare). By such a method, it is possible in a short time to collect a considerable amount of information regarding the general incidence of leprosy in a large area.

The second type of survey is usually made in more limited areas with the object of finding, as far as possible, every case of leprosy. This work takes longer, but the results are more accurate.

The third type has only been attempted in one or two areas and consists of a more thorough epidemiological survey in a small area making a close study of the population, the incidence and transmission of leprosy and of the local factors which may influence these, the object being to gain information on which to base future anti-leprosy activities.

Methods vary according to the objects of the survey, the area to be surveyed and the staff and time available. In general, the principle is to secure as far as possible the co-operation of the local people, to work from village to village and house to house, detecting cases, examining contacts and teaching how the disease is spread and how it can be avoided. In securing these ends, it is often advisable to start a treatment centre where patients can at least be given a certain amount of physical and mental relief.

(b) *Propaganda.*

For the last ten years, the Indian Council of the British Empire Leprosy Relief Association has carried out systematic propaganda in order to try to secure the backing of public opinion. Suitable literature for the general public, for those

suffering from leprosy and for contacts has been prepared and translated into the various vernaculars ; sets of lantern-slides and posters are also used.

Propaganda work is frequently combined with survey work and it has been found that in the villages the former is best based on the actual findings of the latter. Success is to be best obtained by demonstrating to the village people how in their own village certain infectious cases of leprosy have infected others who live in close contact with them, how children are highly susceptible to the disease and more readily infective than adults, and by pointing out the necessity for isolation of infectious cases either inside or outside the village.

(c) *Clinics.*

During the last ten years in the rural areas of India, several hundred clinics have been established for diagnosis and treatment. For reasons of finance, it is usually impossible to maintain a special staff, and most of the clinics are attached to hospitals and dispensaries, the clinics being open at certain hours on one or two days a week. In centres where there is much leprosy and where the doctor in charge of the clinic is keen and able, large numbers of patients will often attend such a clinic and receive treatment, which usually consists of injections of hydnocarpus oil and its ethyl esters. This type of work has many limitations ; the treatment is painful, beneficial results are often not quickly obtainable and the patients get discouraged and discontinue attendance. Infectious cases may attend the clinic regularly for years and still be infectious, whilst all this time they are infecting other people in their village homes ; but, because of lack of funds and staff, it is often impossible to attempt propaganda and preventive work in the homes and villages of the patients. It follows that work in clinics, whilst producing a certain amount of clinical improvement in many cases, cannot be regarded as a very effective anti-leprosy measure.

Some clinics, however, are provided with a special staff. These are open on certain days of the week for diagnosis and treatment and on other days the staff is expected to undertake

survey and propaganda work in surrounding areas with a view to securing a reasonable degree of isolation of infectious cases, particularly children and young people. This kind of work is of undoubted value when it is properly done, but that requires men with ability, and such men are few. Where the clinic does nothing more than give injections and neglects home visits and the organisation of preventive work, little is being accomplished towards control of the disease.

(d) *Isolation.*

In view of the difficulty in dealing with the large numbers of infectious cases of leprosy, it has been thought desirable to encourage isolation of patients either in their homes or preferably outside their villages. In some parts of India in the past, it has been the custom to isolate lepers, but usually only when patients were crippled and deformed and often no longer infectious. Attempts are being made to encourage the isolation of infectious cases ; but, owing to the poverty of the Indian village and the expense involved, and the lack of any public opinion regarding the necessity of this measure, little success is being obtained. In a few places, however, houses for infectious lepers have been built outside the village, the patients maintaining themselves partly by cultivating a plot of land and partly by voluntary gifts from the villagers. In one or two centres, an isolation camp has been erected to serve a group of villages. When isolation outside the village is impossible, it is sometimes possible to secure a certain degree of isolation inside the village by getting a family to build, for the infectious case, a small shed adjacent to but separate from the joint family house. Many years of effective propaganda, however, will be needed before the practice of isolation of infectious cases becomes widespread.

(e) *Leprosaria.*

Institutions now in existence can accommodate about 10,000 cases. A few are organised and staffed by Government and local authorities, but most are established and maintained by Christian Missions with the aid of grants from the Government. Some of the institutions are capable of accommodating as many as 800

patients, but the majority are much smaller, having only fifty to 100 patients.

The work of good leprosy institutions is of great value. They act as centres of isolation and treatment of cases, as centres of training for doctors in anti-leprosy work, as centres of propaganda and as centres for investigation of different forms of treatment. Attempts are being made to encourage the establishment of at least one good leprosarium in each province where the incidence of leprosy is high, but financial difficulties have so far been insurmountable.

In existing institutions in India, males and females are nearly always kept separate and no healthy relatives are allowed inside. There is practically no cohabitation and cases of pregnancy and childbirth in the institutions are therefore of rare occurrence. This policy is facilitated by the fact that the work is on a voluntary basis and that large numbers apply for admission but have to be refused for lack of accommodation. In-patients must obey the rules laid down or they are discharged. Frequently, however, leper parents come for admission bringing healthy children with them, and it has been found necessary to provide homes for these children, although the tendency is to keep them for as short a time as possible in the neighbourhood of a leprosy institution.

One practical difficulty in the management of leprosaria is that of dealing with the chronic cases of nerve leprosy generally regarded as not being infectious. Such cases with trophic ulcers and deformities are often definitely in need of hospitalisation. Also, infectious cases after long isolation and treatment in leprosaria often become non-infectious, but because of deformities and disabilities are unable to return home and support themselves. Experience has shown the need for two types of institution—a hospital for patients in the infectious stages and an asylum for housing the chronic crippled deformed and non-infectious cases. These two types cannot be housed adequately in the same institution.

(f) *Leper Colonies.*

Until recently, no attempt had been made to organise leper agricultural colonies on a self-supporting basis. In one centre,

such work is, however, now being attempted, and in another centre it is being planned. Full self-support is almost impossible, but by the establishment of small leper villages on suitable land it has been found possible for a certain amount of self-support to be attained, although additional financial assistance is always necessary. There are many difficulties associated with this work, but it is possible that the establishment of agricultural colonies may be an important part of anti-leprosy work in the future.

(g) *Training of Doctors.*

The knowledge of leprosy acquired by the ordinary student during his medical course has been found to be inadequate to enable him to diagnose and deal with cases. Special short post-graduate instruction courses are therefore of great value. In the School of Tropical Medicine, Calcutta, the British Empire Leprosy Relief Association, Indian Council, has organised a short two weeks' course in diagnosis and treatment, which is intended for those doctors who are to be in charge of leprosy clinics. For doctors engaged in full-time anti-leprosy work, longer periods of instruction are arranged. In addition, one of the duties of the provincial leprosy officer is to instruct the doctors in his province regarding the diagnosis and management of cases, and frequently a short series of demonstrations and lectures is arranged in various centres. To these courses, the Government doctors are sent and private medical practitioners are invited. By these methods, it has been possible during the last few years greatly to improve the standard of knowledge of the medical profession in India on this question.

5. LEPROSY IN CHILDREN.

Workers in India are coming more and more to the conclusion that the most important thing in the control of leprosy in India is the prevention of infection in children. Epidemiological studies have shown that children and young people are often susceptible, whilst most adults are partly or completely immune, and it is generally believed that serious infections are most

frequently contracted in childhood. Infections contracted in later life tend to produce milder and often non-infectious forms of the disease.

8. DRUG ADDICTION IN INDIA.

By

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Calcutta.

The problem of drug addiction in India presents many features which are widely different from those met with in Western countries and about which a great deal of misapprehension exists in Europe and America. The habitual use of drugs of a stimulative and restorative character was prevalent in India probably before they were used in any of the other countries of the modern world. The juice of the "soma plant" was a favourite drink of the Aryan settlers and was regularly taken by them many centuries before the Christian era. What exactly the "soma plant" was is not known, though a number of plants, such as *Cannabis sativa*, *Ephedra vulgaris*, *Asclepias acida*, have been implicated. During the Hindu period—i.e., up to the eighth or ninth century A.D.—alcoholic beverages were used by the people as well as the preparations made from hemp drugs. These produced not only a sedative effect, but also brought about euphoria in the form of pleasant dreams, forgetfulness and, it would also appear from the writings of that period, voluptuous satisfaction. Opium and poppy were introduced on the west coast about the ninth century A.D. by the advent of the Mohammedan traders, and opiates soon came into use. A study of records shows that, during the period of the Moghul Empire, alcoholic beverages, opiates and hemp drugs were freely used. A decoction made from poppy capsules known as "koknar" was extensively used all over India, and is used to the present day in parts of the Punjab. A beverage containing wine, opium, Indian hemp and poppy capsules, known as "chaharbargha" (four-leaved), was drunk by the well-to-do

classes in the time of Akbar (1556 to 1605) and later. Opium, on account of its stronger effects, appears to have taken a great hold of the people and the poppy was extensively cultivated all over the country during this period and was indulged in by all classes.

OPIMUM.

Opium eating and smoking.

The author's work in the field has shown that most of the raw opium sold in the country is used for addiction purposes in one form or another. It is generally consumed in the form of a pill or solution in water. A study of the records leaves little doubt that opium-smoking has always been an uncommon practice in India. Its incidence amongst various people is very irregular, although there are certain areas and certain classes of population which are badly affected, and these form a very small minority. Opium-smoking, although not common, is still practised in the lower strata of society in many parts of the country. It is common in Assam and in certain parts of the Central Provinces and Berar. The proportion of opium-smokers to opium-eaters in Assam has been variously estimated from one-third to half of the total addicts, but our recent enquiries show that the number has now come down to a quarter. The Government of India and all the provincial Governments have adopted the policy of checking opium-smoking by diminishing the facilities for the practice of the habit through legislation. These measures have succeeded to a great extent, and as a result of this the habit has greatly declined.

Although opium is habitually used by large sections of the population at the present time, the indulgence is not so widely prevalent as might be imagined from some of the recent publications on the subject. The Government of India has strictly adhered to its promise to the League of Nations and has progressively reduced both the production and consumption of opium. We have shown that, although, if the country is taken as a whole, the consumption of opium is low, in certain parts it is very high. On the other hand, there are extensive areas in all provinces where consumption is very low—*i.e.*, 2

to 10 lb. per 10,000 of population per annum as compared with 12 lb., the standard laid down by the League of Nations as being necessary for the medical and scientific needs of the population. Such areas are now on the increase. It will thus be seen that the habit is not widely disseminated among the population ; its incidence among various classes is very irregular. The areas with a high consumption rate are being investigated with a view to determining the causes which have led to it, and steps are being taken to put down excessive use of the drug.

Addiction to Post (Unlanced Capsules of Papaver somniferum).

The habitual use of poppy capsules for euphoric purposes has considerably decreased during the last three decades, but the addiction is still prevalent in certain districts of the Punjab and in many parts of Rajputana. The writer, after a study of over 500 addicts, has come to the conclusion that the habitual use of poppy heads produces physical, mental and moral degeneration in the habitué ; as compared with the opium habit, its effects on the individual are much more pronounced.

Addiction to Opium Alkaloids.

Habitual use of morphine has considerably increased in India during recent years, the increase at present being confined to Northern India. There appears to be grave danger of rapid extension of this habit to other parts if steps are not taken to check it. Morphine addiction among Indians is usually met with in young persons between the ages of 20 and 25 years. The habit produces a state of chronic toxæmia and detrimentally affects all tissues of the body, particularly the nervous tissues. In morphine habitués, physical, mental and moral deterioration sets in much more rapidly than in opium addicts.

Administration of Opium to Infants.

Habitual administration of opium to infants at certain periods of their lives has been prevalent in India for many centuries. The habit appears to have been started because of the drug's power of allaying diarrhoea and vomiting, relieving cough and

pain, and producing sleep. The custom, although it is still met with in almost every part of India, has greatly declined during the last two or three decades. The drug, however, is still extensively employed in the Central Provinces and Berar and in the industrial areas in all parts of India.

HEMP DRUGS.

Indian hemp grows wild in the montane and submontane tracts over the whole of the north-eastern and north-western parts of India, and three of its preparations—*i.e.*, “*bhāṅg*” (dried leaves), “*charas*” (resinous exudate) and “*ganja*” (flowering tops)—were in the past largely used by the poorer classes on account of their very low cost. Even to the present day hemp drugs are the narcotics most extensively employed by the poorer classes throughout the country. Extensive work in the field has enabled the writer to estimate approximately the prevalence of hemp drugs addiction in India, and, taking the country as a whole, the incidence of addiction in British India ranges between 0.5 to 1% of the population. In South India, where the spontaneous growth of *Cannabis sativa* does not occur, hemp was, and still is, cultivated for use as a drug of addiction.

ALCOHOL AND COUNTRY BEERS.

The aboriginal races of India made a beverage by fermenting rice (“*pachwai*”) and by fermenting palm juice (“*tari*”). Both these are extensively used in many parts of India to the present day. The fluid that is habitually drunk by the Nagas of the Assam Hills (Manipore State) is a weak country beer called “*zu*”. The writer has shown that the alcoholic content of the majority of the crude beers used in India is low and their nutritive value is very high. Some of these beers are rich in vitamin content, which is often poor in the general dietary of the people who drink them. The areas where such beers are consumed are remarkably free from deficiency diseases. The drinking of youth and the social drinking in the endeavour to mitigate the wear and tear of life and to get relief from its annoying factors, as it exists in the West, is not commonly found among Indians.

COCAINE HABIT.

Cocaine is usually taken in the form of an injection or as a snuff in Western countries, but at present practically the only method of taking the drug in India is by the mouth. It is commonly consumed by putting it in pan or betel leaf, and for that reason addiction to this alkaloid is prevalent among the betel-leaf chewing population of North-West India, Bengal, Bihar, the United Provinces and the Punjab. The habit not only exists among the well-to-do people, but a large number of the artisan class in large towns are also addicted to it.

NEW DRUG HABIT.

During the last few years, chloral hydrate as a drug of addiction has also made its appearance in Northern India. It has come into use since the price of spirituous drinks has gone up considerably on account of the increased excise duty. Most of those who drink alcohol habitually in India do not take it merely to obtain mild excitement or sedative effects, as is usually the case in the West, but to obtain intoxicating effects. Owing to increase in the price of liquor, they cannot afford to buy sufficient quantities for this purpose, and the ingenious idea of potentiating the effects by adding small quantities of chloral hydrate (0.5 to 1 gm.) has occurred to them. The drug is also sometimes mixed with tea and is habitually consumed by some people. The chloral habit has thus sprung up, though fortunately a very limited area is affected at present. The drug is powerful and toxic, and several fatalities have been reported from accidental overdoses. The habit is harmful and dangerous. It is much more liable to produce pathological changes in the organs and immediately fatal results than any other drug of addiction in this country. The mental, moral and physical effects produced by this addiction are more pronounced than in any other drug habit.

BARBITURIC ACID DERIVATIVES.

During recent years, a large number of the barbituric acid compounds have been introduced into therapeutics, including

barbitone (veronal), sodium barbitone (medinal), luminal, dial, allonal, veramon, neobutal, amytal, evipan, pyramidon. A number of fatalities resulting from indiscriminate therapeutic use and self-medication with these drugs have occurred, and a few cases of addiction have also been observed among the educated classes in India. The fact that, besides the toxic effects produced by massive doses, the barbiturates also produce dangerous cumulative effects and a tendency to habit formation has not been sufficiently appreciated by the medical practitioners in this country.

TREATMENT OF DRUG ADDICTS.

Following the lead indicated by our biophysical and biochemical researches, a large amount of work has been done in connection with lecithin treatment of opium addiction in the Carmichael Hospital for Tropical Diseases. The treatment has been tried with success on more than 100 addicts who were taking doses of opium ranging from 45 to 200 grains daily. The method is as follows :

On admission, the patient is given a dose of calomel and salts to clear his bowels. On the second day, the drug is completely withdrawn, and, when the withdrawal symptoms develop, he is put on 30 to 60 grains of lecithin (ovo-lecithin Merck) twice or three times a day. Lecithin appears to decrease the intensity of the withdrawal symptoms and shortens their duration. In spite of this, in some patients the symptoms are severe, and in these intravenous injections of 25 c.c. of a 25% solution of glucose and also glucose by mouth greatly help to ameliorate the condition. The patient's bowels and liver are kept active by an early morning dose of a saline purgative and this helps in eliminating toxins from the system. The untoward symptoms such as low blood-pressure and feeble pulse, are combated by means of cardiac stimulants. Adrenaline given in ten-minim doses in water by the mouth checks tendency to vomiting and nausea. The diarrhoea which is often a troublesome symptom is controlled by administration of simple drugs like bismuth carbonate and pulv. cretae-aromaticus in 10 to 15 grain doses. The cramps and pains all over the body are treated by massage

and administration of analgesics, such as aspirin, phenacetine and veramon.

The total course of treatment varies from seven to twelve days, and during this period the change in the condition is marvellous. The patients treated in the hospital are kept under further observations for a period varying from four to twelve weeks in order to rehabilitate and change and train them to the new environment and to watch for any relapse occurring. The period of rehabilitation and rebuilding of the personality of an addict may sometime extend to six months, according to the personality of the addict.

9. INDIAN RED CROSS SOCIETY.

By

Miss Norah HILL, A.R.R.C., Organising Secretary.

ORGANISATION.

The Indian Red Cross Society, of which His Excellency the Viceroy is President, is a voluntary organisation, not subsidised by the Government, but administered by a Managing Body on which officials and non-officials sit together. Its activities are reported on in the annual report of the Public Health Commissioner with the Government of India. At the end of 1935, it had twenty-four provincial and State branches, approximately 200 district branches, some of which are again divided into sub-branches at tehsil headquarters, and a total membership of 18,713. The Junior Red Cross had 9,168 school groups with a total membership of 370,669.

PERSONNEL.

The headquarters personnel includes an Organising Secretary, Assistant Secretary and the following technical officers : Director, Maternity and Child Welfare Bureau ; Director,

Junior Red Cross (half-time) ; Organising Secretary, King George Thanksgiving (Anti-Tuberculosis) Fund.

ACTIVITIES.

The main activities of the Indian Red Cross Society are : (1) child welfare work (see under No. 10) ; (2) health education of adults ; (3) Junior Red Cross school activities ; (4) supply of comforts and additional nursing staff to hospitals ; (5) disaster relief work ; and (6) anti-tuberculosis preventive activities (King George Thanksgiving (Anti-Tuberculosis) Fund).

Following the headings of the League of Nations Agenda for the Conference, the Red Cross activities of special interest to the Conference are :

I. *Health Services.*

A large amount of popular health instruction is carried out by Red Cross district branches, some of which is done in villages, by means of travelling lecturers, magic-lanterns, health films, Junior Red Cross dramas and singing parties, posters, pamphlets, etc. Especially in the Punjab and United Provinces, Junior Red Cross propaganda parties commonly attend agricultural fairs and visit villages.

Headquarters maintains a film-production department, a film-lending library and a depot of propaganda material, slides, posters, etc. Between 200 and 300 film loans are made annually, and about Rs.20,000 of propaganda material is distributed. This does not include a vast amount of vernacular material distributed locally by branches.

II. *Rural Reconstruction.*

Most Red Cross district branches carry on some work in villages. The C.P. Red Cross in 1935 received a Government grant of Rs.5,000 to establish rural welfare centres. In the Punjab and the United Provinces, junior groups do valuable reconstruction work in villages. Bombay has travelling dispensaries.

A " Rural Programme for Red Cross Branches " has been issued.

A film entitled " Self-help in the Village " is under preparation by the headquarters film-production department.

III. *Sanitation and Sanitary Engineering.*

(1) *Housing.* — A film called " Two ways of living ; which deals with housing has been produced.

(2) *Water Supply.* — Junior Red Cross groups often improve school and village wells as part of their health programme.

(3) *Campaign against Flies.* — Popular health education on this subject forms part of our programme, and films, posters, pamphlets and slides on the subject are available.

IV. *Nutrition.*

Education on the importance of a balanced diet forms part of the junior programme, and articles on the subject by Dr. AYKROYD and others have been published in the *Red Cross Journal*.

Red Cross health visitors teach village women on the proper feeding of infants and Junior Red Cross groups in some places give midday lunches of sprouted grain. Milk propaganda is being carried on.

V. *Measures for combating Diseases in Rural Districts.* See (1) above.

BUDGET.

The Indian Red Cross Society headquarters income is approximately Rs.3,31,829 (excluding special earmarked funds), of which Rs.2,99,535 is income from investments ; the remainder comes from 10% of subscriptions, etc. Provincial, State and district branches derive their income from grants from headquarters, investments, subscriptions and donations.

10. MATERNITY AND CHILD WELFARE BUREAU OF THE INDIAN RED CROSS SOCIETY.

By

Dr. Jeane ORKNEY, W.M.S., Secretary, Maternity and Child Welfare
Bureau.

ORGANISATION.

The Maternity and Child Welfare Bureau, Indian Red Cross Society, is in charge of a medical woman with public health experience and qualifications. The Bureau has a semi-official status by virtue of the fact that the Director-General, Indian Medical Service, the Public Health Commissioner with the Government of India and the Director-General, A.M.S., are *ex officio* members of the Committee of Management.

Provincial and State branches of the Indian Red Cross Society have *ad hoc* sub-committees for maternity and child welfare, modelled on the Bureau Committee in some provinces ; in others, the contacts between the society and the medical and public health departments are less intimate.

The actual management of maternity and child welfare schemes is done by the district branches of the society either directly or through local committees.

STAFFING.

The Director of the Maternity and Child Welfare Bureau tries to keep in touch with district work by touring, but the area to be covered is so large that each district is visited on an average once in four years.

A few provincial and State branches subsidised from public health budgets employ medical women as directors of maternity and child welfare ; others employ experienced health visitors as provincial organisers ; others have to depend for technical advice and direction on the goodwill and interest of touring officers of the public health departments, and some receive no guidance whatsoever.

Progress has been most rapid in the States and provinces employing a technical officer or where the advice of a woman

assistant to the Director of Public Health is available, as in Madras Presidency.

The staff employed by district branches and local committees varies. Health visitors, nurses, midwives and nurse dais and trained indigenous dais all have a definite rôle to play. Unfortunately, the tendency is to employ the lower grades of worker and to place them in charge of welfare centres, village maternity homes and dais' training schemes, work which they are incapable of doing efficiently, although normal midwifery and the treatment of minor ailments is within their capacity.

As employees of voluntary societies, women workers are less liable to exploitation, have greater security of tenure and better conditions of service generally than as servants of district boards or other local authorities.

The Maternity and Child Welfare Bureau administers (1) the Victoria Memorial Scholarships Fund, (2) the Lady Chelmsford League Fund and (3) an annual income from various sources intended for maternity and child welfare amongst the families of soldiers in India.

The Victoria Memorial Scholarships Fund was constituted in 1903 with the object of raising the standard of midwifery by "training midwives in the wards of female hospitals and training-schools in such a manner as will enable them to carry out their hereditary calling in harmony with the religious feelings of the people".

The organisers of the fund realised that the solution of the midwife problem lay in training the indigenous or hereditary dai. As the original method of training given in hospitals and institutions proved impracticable, partly because the dais could not be persuaded to take a training which offered no obvious advantages, in 1918 a different method was instituted. Instruction classes for dais were established. Theoretical instruction proved comparatively easy to arrange, but difficulty arose over the supervision of the practical training, particularly of dais in outlying villages. The teachers, generally mission doctors and health visitors, had other duties and could not reasonably be expected to supervise the conduct of twenty confinements for each dai under training. To meet this difficulty, the tendency in recent years has been to establish dais' training-

schools in connection with a women's hospital, a maternity home or a lying-in ward at a welfare centre. The more intelligent dais are sent for intensive and more detailed training in hospital as well as domiciliary methods.

As compared with thirty years ago, many more women are now confined in institutions, and a superior class of woman is coming forward for training; but it is still true to say of many rural areas that the only hope of improving midwifery is to train and supervise the indigenous dai.

Women of a superior class have still little chance of ousting the indigenous dai or of competing with her successfully in private practice unless they are attached to a body or institution which is prepared to do propaganda on behalf of clean midwifery and to guarantee a living wage in the initial period and which can give the midwife or dai a certain status and authority.

The objects of *The Lady Chelmsford League Fund*, constituted in 1918, are :

- (1) To promote the establishment and maintenance of training-schools for health visitors;
- (2) To produce propaganda material—for example, pamphlets, posters, slides, films and articles in journals;
- (3) To maintain a central bureau of information; and
- (4) To give grants-in-aid to experimental schemes, such as nursery schools and crèches training teachers and children's nurses, and to provide scholarships for medical women taking the diploma in maternity and child welfare course at the All-India Institute of Hygiene and Public Health.

Four of the seven health schools in India are aided from the Lady Chelmsford League Fund, and applications for grants have been received from two other provinces which expect to open schools in 1937.

The length of the course of training varies from nine to eighteen months and the medium of instruction may be either English or a vernacular.

Vernacular-trained students have not in the past been very successful in India. The most probable reasons are (1) the

poor general education of the pupils, (2) the lack of vernacular text-books and literature from which the students can supplement the lectures, and, still more important, lack of adequate expert supervision and refresher courses.

It seems probable that at no very distant date all provincial health schools will train vernacular students and that one central institution will give a training in English designed to fit the pupils for the more responsible administrative and supervisory posts.

CHILD WELFARE.

Economic security, good housing and sanitation, and a certain amount of discipline make the families of sepoys fertile ground for maternity and child welfare. The families carry back to their villages some positive health knowledge and a greatly depleted store of prejudice and superstition.

Grants-in-aid are given for the maintenance and staffing of Indian family hospitals, unit welfare centres and lying-in wards and to some extent also for dispensary work in the lines.

Provincial and State branches carry on similar activities. The scope of the work varies tremendously with the enthusiasm and enlightenment of the provincial committee and the degree of responsibility for maternity and child welfare assumed by the public health department.

District branches and local committees are responsible for the actual establishment and management of the maternity and child welfare services, including the maintenance of small maternity homes, the provision of trained dais and midwives for district midwifery and the maintenance of welfare centres and the training and supervision of the indigenous dai in the locality.

BUDGETS.

In round figures, the total annual budget of the Maternity and Child Welfare Bureau amounts to Rs.1,20,000, including about Rs.25,000 earmarked for army child welfare.

The income is derived from invested funds and a grant of Rs.5,000 from the Commander-in-Chief for army child welfare.

The income of provincial and district branches is derived from invested funds, grants from I.R.C.S. headquarters, subscriptions and donations and from official sources in certain instances.

II. ST. JOHN AMBULANCE ASSOCIATION.

By

Miss Norah HILL, A.R.R.C., Secretary.

The St. John Ambulance Association, Indian Council, is a voluntary association, of which His Excellency the Viceroy is President and His Excellency the Commander-in-Chief Chairman of the Council. Like the Red Cross, it is administered by an Executive Committee of officials and non-officials. Unlike the Red Cross, it receives a small Government subsidy of Rs.5,000 per annum.

The association has provincial and State centres (subdivided into district centres) and railway centres. Its membership in 1935 was 446.

The headquarters personnel includes a General Secretary (part-time Red Cross), an Assistant Secretary (part-time Red Cross) and an Ambulance Brigade Training Officer (part-time Red Cross).

The association organises classes in first aid, home nursing, hygiene and mothercraft, organises ambulance competitions and fosters the formation of uniformed ambulance brigade divisions. In 1935, it trained 25,628 persons in first aid, 1,414 in home nursing, 803 in hygiene and 260 in mothercraft. In addition, 10,643 students were given an elementary combined first-aid and hygiene course for schools.

The association has no special rural activities, but many of its classes are held in rural areas and it has been instrumental in spreading a knowledge of first aid among schoolboys, police, railwaymen, miners, village patwaris and members of criminal tribes in rural areas.

The total income of the association at headquarters in 1935 was Rs.19,076, of which Rs.5,000 was a Government grant, the remainder coming from membership subscription, fees for certificates, etc. Provincial, State and railway centres receive no regular grants from headquarters, but depend on membership subscriptions, donations, etc., for their income.

Reports of Indian Provinces and Indian States

OMISSIS.

Owing to lack of space, descriptions of institutions and organisations of a purely urban character and details of medical and health organisations which do not add any relevant information have been omitted.

For the same reason, a large number of enclosures, annexes, drawings and photographs have not been reproduced. It is hoped that the various delegations will be able to bring additional copies of such material in order that it may be shown to those delegates who wish to examine it.

If a subject has already been dealt with in the preceding chapters—i.e., in the report and notes referring to the Central Government's health organisation—repetitions in the Provincial and States' reports have been omitted (e.g., vital statistics, methods of registration, etc). Descriptions of health measures in connection with fairs and festivals, industrial hygiene, prisons, pilgrimages and port health work have also been omitted.

TERMS FREQUENTLY EMPLOYED IN THE FOLLOWING NOTES.

(*Note by the Editor.*)

Anna	$\frac{1}{16}$ of a rupee.
Chaukidar	Village watchman.
Dai	Indigenous midwife.
Kutcha	Everything that is not pukkah (see below).
Lakh	100,000.
Mofussil	Rural area.
Panchayat	Committee of notables, elected by the village, typically consisting of five members.
Pie	$\frac{1}{12}$ of an anna.
Pucca or Pukkah . .	Genuine, real, completely up to standard ; if relating to constructions, brick and mortar, or built in cement.
Rupee	£0.075— <i>i.e.</i> , £1 sterling = Rs. 13.33.
Taluk ; tehsil ; tahsil.	Revenue divisions, being parts of a district.
Tahsilder, tehsildar .	Revenue officers.
Thana	Police station, sub-division of a district in the police administration. A number of thanas usually form a tahsil. The thana is usually the unit for registration of vital statistics.

12. MEDICAL AND HEALTH ORGANISATION IN THE PROVINCE OF ASSAM

By

Colonel C. E. PALMER, I.M.S.,
Inspector-General of Civil Hospitals, Assam ;

and

Lieut.-Col. T. D. MURISON, I.M.S.,
Director of Public Health, Assam.

The Province of Assam is composed of eight plains districts, four hill districts, two frontier political tracts and a native State with an aggregate population of 9,247,857 and an area of 67,334 square miles.

CENTRAL ADMINISTRATION.

The Public Health Administration of Assam in general is under the control of the Honourable Minister in the Local Self-government Department.

(a) The Inspector-General of Civil Hospitals is the administrative head of the Medical Relief Organisation.

There are altogether 267 hospitals and dispensaries of all classes, of which 46 are State public institutions, 31 State special (police, 24; forest, 3; others, 4), 164 local fund, 5 private aided, 8 private non-aided and 13 railway dispensaries where people receive medical treatment.

There is a mental hospital at Tezpur for the treatment of Indian lunatics of this province. This hospital has since been entirely reconstructed with an accommodation for 690 patients. European lunatics are, as in the past, sent to the Ranchi Mental Hospital in the Province of Bihar and Orissa, the cost being met by this Government.

(b) The Director of Public Health is the administrative head of the Public Health Department and there are two Assistant Directors of Public Health to help him. The civil surgeons of districts are the health officers of their respective districts.

All important public health projects affecting the province are considered and reported on by the Provincial Public Health Board, which is constituted as follows : The Inspector-General of Civil Hospitals, Assam (president); the Chief Engineer and Secretary to Government in the Public Works Department, two Commissioners, one non-official member; the Director of Public Health, Assam (secretary).

There is at present no Public Health Engineer. This post has been abolished.

There is a Provincial Public Health Laboratory as well as a Pasteur Institute and Medical Research Institute in the province.

Medical Education

There is still only one Medical School in this province, which is located at Dibrugarh. The proposal for the establishment of a second Medical School at Sylhet has not yet materialised, owing to financial stringency. There being no Medical College in this province, the arrangements made with the Government of Bengal for collegiate medical education, medical education of female sub-assistant surgeons, post-graduate studies, training in tropical medicines, etc., still continue.

Maternity and Child Welfare

Every endeavour is being made to train midwives, nurses and health visitors through the funds of the Red Cross Society and the Countess of Dufferin's Fund. The training of dais has been taken up by the district Red Cross branches in addition to the Berry White Medical School, Dibrugarh, and at the Lady Kerr Welfare Centre, Schillong.

The provincial branch of the Countess of Dufferin's Fund continues to pay subsidies to local bodies throughout the province towards the entertainment of lady doctors, midwives, nurses, dais and women attendants, etc., as well as towards the training of nurses, midwives and dais, etc. A hospital for women and children, opened in Schillong in December 1935, under the control of the Assam branch of the fund, meets the

needs of a Dufferin Hospital in the province. Two-thirds of the annual cost of the hospital is borne by the Government of Assam and the balance by the Central Council of the fund.

Public Health Propaganda.

This consists in giving lantern demonstrations and lectures to the inhabitants of villages and village schools by the Public Health Department assistant surgeons in the course of their tours in the districts. The demonstrations and lectures are confined to those common diseases prevalent in Assam, such as cholera, smallpox, leprosy, kala-azar, malaria, tuberculosis, typhoid and blindness, as well as on general sanitation and food. The expenditure is met partly from the King George Thanksgiving (Anti-Tuberculosis) Fund and partly from the public health budget. Pamphlets and charts are distributed for propaganda and publicity purposes. The Assistant Directors of Public Health, in the course of their inspection of schools, deliver lectures on preventable diseases and general sanitation to pupils and teachers. Magic-lantern demonstrations and lectures on the commoner diseases prevalent in Assam are given regularly in villages and village schools. Groups of villages have been constituted into village authorities under the Local Self-government Act. These authorities endeavour to improve the sanitation of villages in their charge by providing water supplies, constructing village paths, etc.

RURAL SANITATION.

Improvement of water supplies is the principal item of rural sanitation. Every year, new tanks or wells are constructed in areas where they are most needed. The Government makes grants to local boards to improve their water supplies in rural areas. These supplies are inadequate. The Government of India contributed a handsome gift of Rs. 3,00,000 to Assam for the improvement of water supplies in rural areas in 1935/36.

All important municipal towns have waterworks, and their inhabitants are supplied with filtered water. Other towns and

villages have public tanks or wells supplemented by private tanks and wells. The local government makes grants to local boards for improvement of rural water supplies. The Government of India has also contributed a handsome gift of Rs. 3,00,000 for the improvement of water supplies in rural areas. There are prescribed type plans for tanks, wells, water-lifts and fencing.

Sanitation in Tea-gardens.

Immigrant labourers for tea-gardens are conveyed by steamer and rail to gardens. Every vessel conveying immigrants must have a qualified medical officer on board. The master of the vessel and the medical officer are conjointly responsible for the care of immigrants. Sale of unwholesome food to immigrants is forbidden. Latrines are kept constantly clean and disinfected. The immigrants are mustered every morning and examined by the medical officer. Rations for these immigrants are issued daily by the medical officer according to a prescribed scale and sufficiently early to admit of the food being prepared for distribution in the morning and evening. The medical officer satisfies himself that the food has been properly cooked. Stale food is not permitted. Motherless infants and invalids are given suitable and freshly prepared food ordered for them every three or four hours. Proper care is also taken for the provision of a good water supply. Steamers carrying immigrants are inspected at ports of inspection by Government medical officers. The same care is taken with regard to the supply of food and drinking-water when immigrants are being transported by rail. Third-class carriages are reserved for them, and in no case is the regulation number in each carriage exceeded. If cholera, smallpox, plague, enteric fever, influenza or other serious epidemic, infectious or contagious disease occurs in any depot in which assisted emigrants or members of their families are usually accommodated, the person in charge of the depot must take immediate steps to secure the removal of the person attacked to the nearest available hospital accommodating infectious or contagious cases or to such other place as the medical officer may have approved for the purpose,

and shall report the occurrence without delay to the medical officer. In cholera, smallpox, plague, enteric, influenza or other serious epidemic, infectious or contagious disease occurs among assisted emigrants or their families while on a journey, the escort shall at once report the occurrence to the medical officer and arrange for the removal, as soon as possible, of the person attacked to the nearest available hospital accommodating infectious or contagious cases or to such other place as the medical officer may have approved for the purpose. He shall take the remaining emigrants to the nearest depot maintained or used by the employing interest concerned. All cases of and deaths from cholera, smallpox, plague, enteric and influenza shall be notified at once to the medical officer. The person in charge of the depot shall maintain a separate register for cases and deaths from such diseases. The person in charge of the depot shall provide clean towels and basins in sufficient numbers at the depot and shall stock therein sufficient quantities of disinfectants, such as chlorinated lime, permanganate of potash, cyllin and cyllin soap. The person in charge of a depot shall carry out all instructions given him by the medical officer in connection with any infectious or dangerous disease which has broken out at the depot. A permanent segregation shed, with sufficient accommodation for at least ten patients, shall be provided for each depot at such distance from the quarters used for the accommodation of emigrants as the medical officer may direct. The controller may exempt any depot from the necessity of having a permanent segregation shed or may reduce the scale of accommodation to be supplied. On the outbreak at a depot of cholera, smallpox or other dangerous infectious disease, the medical officer may, if he is satisfied that the existing provision is likely to prove inadequate, require the person in charge to erect or secure further temporary accommodation for the segregation and treatment of patients or contact cases. The person in charge of a depot shall make all necessary arrangement for the disposal, either by burning or burial, of the bodies of assisted emigrants or members of their families, or intending assisted emigrants in his charge, who die either in his depot or in the hospital, and defray all expenses connected therewith.

MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Kala-azar, smallpox, cholera, malaria and leprosy are the principal infectious diseases in Assam. Plague is not endemic in Assam, but is sometimes imported from other provinces.

Malaria.

Malarial fever is by far the greatest scourge of the province. It is prevalent throughout the province in greater or lesser degree at all times in epidemic form. A provincial Advisory Malaria Committee consisting of the following persons has been constituted with the object of dealing with the malaria problem of the province and also for the purpose of advising the Government : Inspector-General of Civil Hospital, Assam (president) ; Principal, Ross Institute ; Research Officer, Assam Medical Research Society ; Secretary, Assam Medical Research Society ; Secretary, Transferred Departments ; two non-official members of the Assam Legislative Council (members) ; Director of Public Health, Assam (secretary). The object in forming the committee is to obtain co-ordination between various authorities interested in the malaria problem in the province. Anti-malarial measures are undertaken in an area provided the local bodies concerned contribute 50% of the estimated expenditure and the other half is supplemented by a Government grant. Both the Assistant Directors of Public Health are trained in malariology. Anti-malaria work is undertaken by Assistant Directors of Public Health independently in some areas and by the Assam Medical Research Society in co-operation with the Public Health Department in others. The Assam Medical Research Society is in receipt of an annual contribution from the Government of Assam, and the services of the sub-assistant surgeons of the Public Health Department, not exceeding ten in number every year, are placed at the disposal of the society for anti-malarial training and for duty in areas in which anti-malarial work is undertaken by the society. The medical research officer in the employ of the Assam Medical Research Society holds an annual training-class in Shillong in which

both theoretical and practical training, including field training in anti-malarial methods, is given to the sub-assistant surgeons and others. The activities of the Assam Medical Research Society are at present chiefly confined to malarial research, which includes survey, treatment schemes and anti-larval measures. The results obtained so far have been most encouraging. Anti-malarial measures are also being undertaken at Lokra, Charduar and Pasighat with funds provided by the Government of India.

Quinine is distributed free to indigent malaria patients in addition to the usual sale of quinine. In 1936, a total gift of 4,500 lb. of quinine sulph. was given by the Government of India of the Government of Assam for free distribution in the province to really indigent patients through the agency of the Public Health Department, local board and State dispensaries. The distribution of this quinine is being spread over a period of three years. In order to make quinine more easily available and at a cheaper price, a new and recommended drug named "quinine reinforced cinchona febrifuge" in tablet form containing one part of quinine and three parts of cinchona was introduced in 1934. Each treatment consists of 20 grains of quinine sulphate and 60 grains cinchona febrifuge made up into 20 tablets each of 4 grains. The price of this new drug was fixed at 3 annas 9 pie per treatment as against 4 annas 6 pie per treatment of quinine sulph. containing a like number of tablets. Sales, on the whole, were found disappointing, and, in order to overcome this, this drug is now sold to the public in a smaller treatment containing 10 tablets of 4 grains each at 2 annas each. This amount of the drug is sufficient to ameliorate all the symptoms of an ordinary attack of malaria and thereby permit a patient to regain his earning capacity quickly and at the same time be as cheap as possible.

Plague.

The province is generally free from plague.

A small stock of Haffkine's vaccine will be maintained at the Pasteur Institute and small quantities may be obtained on an emergency, by reference to the Director.

Tuberculosis.

No special arrangements exist for the treatment of this disease, excepting small wards in some of the hospitals at district headquarters.

Yaws.

This disease is very widely prevalent in Assam and there is every indication that it is showing a tendency to spread. The Public Health Department dispensaries in this province undertake the treatment of yaws *pari passu* and in conjunction with the treatment of Kala-azar, leprosy, etc. The results of treatment have been found most encouraging.

Leprosy.

The following institutions are now at work in this province for the treatment of lepers :

- (1) Leper asylums at Sylhet and Gauhati ;
- (2) Leper hospital at Kohima ;
- (3) Leper ward at Dhubri ;
- (4) Leper colonies at Tura and Jorhat.

Treatment is available in out-patients' clinics at Sadr and sub-divisional headquarters hospitals and at many of the more important outlying dispensaries. Establishment of leper homes and colonies in or near all municipal towns is under the consideration of the Government. A large number of Public Health Department dispensaries are treating this disease at their main and out centres.

Smallpox and Vaccination.

The death-rate from smallpox has been reduced by vaccination ; but certain classes of people have still a marked prejudice against vaccination. The areas inhabited by these people generally form the foci of infection, and from there the disease spreads to other parts. With the progress of education this prejudice is gradually being overcome. The number of cases and the death-rate from smallpox during the last three

years was, in 1933, 247, death rate 0.03 ; in 1934, 206, death rate 0.03 ; in 1935, 529, death rate 0.07.

There is a vaccine depot at Shillong (under the direct charge of the Director of Public Health) in which vaccine lymph is manufactured.

The subjoined table shows the number of persons vaccinated and the number of vaccinators appointed in the last three years :

	Total number of vaccinators	Total number of persons vaccinated
1933/34	435	706,460
1934/35	444	704,936
1935/36	434	852,685

There are thirty-nine inspectors and sub-inspectors of vaccination to check the work of the vaccinators. The superior inspecting officers are the Director of Public Health, Assistant Directors of Public Health, civil surgeons, sub-divisional medical officers and assistant surgeons of the Public Health Department. The percentage of inspections done by the subordinate staff depends on the nature of the country and the density of population in their charge, but 60 to 70% of inspections are generally insisted upon. In the cold weather vaccination season, the subordinate vaccinating staff spend twenty-three days on tour. Vaccination is compulsory in all municipal towns under the Bengal Vaccination Act V of 1880. This Act may be extended by notification in the *Assam Gazette* to villages when threatened with smallpox and when its inhabitants oppose vaccination.

Vaccination is thus rendered compulsory in that village and the regulations remain in force for a period of one year from the date of notification.

Cholera.

Five epidemic units, consisting of fifteen sub-assistant surgeons and thirty disinfectant carriers have been sanctioned principally for the control of cholera in the province. The special features of the units are that they are mobile and so equipped that they can be brought to the scene of an outbreak with the least possible delay. Contacts are inoculated, water supplies

disinfected and essential oil mixture and bacteriophage is distributed wholesale.

The subjoined table shows the number of cholera inoculations and bacteriophage issued during the last three years :

	Cholera vaccine (c.c.)	Bacteriophage (doses)
1933	451,884	707,164
1934	171,117	871,316
1935	475,955 ½	1,020,481

Kala-azar.

The treatment of kala-azar is being pushed on as usual. The disease is now well under control. In view of this, the special Public Health Department dispensaries have been enabled, in addition, to extend their activities to other prevalent diseases, amongst which may be mentioned malaria, leprosy, yaws and minor eye complaints.

Civil surgeons in charge of districts that are infected with kala-azar are responsible for the proper and efficient execution of operations against the disease. These officers tour extensively and regularly in their districts, inspecting and checking the work of subordinates under their control. All returns and correspondence in connection with the disease are submitted by them to the Director of Public Health. For this purpose, they are provided with a special kala-azar clerical staff.

There are two Assistant Directors of Public Health with their headquarters at Sylhet and Gauhati. They tour almost continuously throughout the year and relieve civil surgeons of much of their touring in connection with kala-azar, vaccination, etc.

There are six Public Health Department special kala-azar assistant surgeons. They constantly tour in their respective districts, checking the work of sub-assistant surgeons and bringing all matters of importance to the notice of their respective civil surgeons.

In each infected district, all local board sub-assistant surgeons in charge of local board dispensaries treat, in addition to their ordinary medical duties, all kala-azar cases attending at their dispensaries, and, in addition, they are held responsible for the

discovery and treatment of all fresh cases in villages within a five-mile radius of their dispensaries. In order to do this, they visit and revisit all these villages regularly and constantly. Powers to compel attendance at dispensaries and hospitals have been provided in regulations framed under the Epidemic Diseases Act.

Venereal Disease.

As in the past, venereal diseases are treated in our hospitals and dispensaries. The anti-syphilis campaign still continues to function in the Naga and Lushai Hills districts.

13. NOTES ON MEDICAL AND PUBLIC HEALTH ORGANISATIONS IN BENGAL, FOLLOWED BY NOTES ON EDUCATION AND ON CO-OPERATIVE SOCIETIES.

Area : 77,521 square miles
Population : 50,114,002.
Districts : 28

A. MEDICAL SERVICES IN BENGAL.

By

Lieut.-Colonel T. C. BOYD, I.M.S.,
Officiating Surgeon-General with the Government of Bengal.

In order to attain the full development of the medical-hospital services of the province on a satisfactory geographical basis, the first essential need would be to improve considerably the ill-developed means of communications throughout most of the province and study intensely those that already exist or are likely to mature at a comparatively early date.

It will appear from the respective census figures given below that the question of increasing population also presents another difficult problem from the point of view of public health and

adequate medical-hospital facilities on the basis of population, coupled with the question of economics and nutrition.

Year	Population	Increase
1872	34,123,972	—
1881	36,322,302	2,198,330
1891	39,095,855	2,773,553
1901	42,147,895	3,052,040
1911	45,489,697	3,341,802
1921	46,702,307	1,212,610
1931	50,114,002	3,411,695

Improvement of the general economic condition of the rural population might be facilitated by propaganda work aiming at rousing in them a spirit and consciousness for medical relief work.

At present, propaganda is mostly left to the Public Health Department, whereas it appears that much useful work should also be done in this direction by the curative and administrative side, with a view to get the people more interested in the construction of new hospitals and the better utilisation and improvement of the existing ones.

Medical Organisation in the District.

The actual medical organisation in the district, which is in charge of a civil surgeon, consists of a network of hospitals and dispensaries working, as a rule, under the management and administrative control of the local bodies, such as district boards, municipalities, etc., bodies constituted under the Charitable Endowment Act, or private bodies or individuals, and these may be classified into three main categories.

(1) Those under the district board and municipalities and bodies under the Charitable Endowment Act. — These are fairly well-equipped institutions with indoor accommodation in some (invariably in the district and sub-divisional headquarters). Some of the district headquarters hospitals are provided with modern facilities, such as X-rays, laboratories, etc. All hospitals at the district and subdivisional headquarters have operating theatres.

(2) Dispensaries under the union boards. — These are outdoor dispensaries of a simple type.

(3) Village dispensaries. — These are also outdoor institutions maintained or aided by district boards and are of the type of category (2).

Besides the above, there are a number of dispensaries following homœopathic, ayurvedic and unani systems of medicines. There are also some subsidised dispensaries in Bengal the number of which, at the moment, is only ten.

The following statistics show the improvement so far made in respect of the medical relief work in Bengal since 1927 in the rural areas :

	1927	1935
Number of dispensaries	1,088	1,298
Number of beds	5,518	6,067
Average area served by dispensary (square miles)	71	59
Average population served by a dispensary	41,884	37,637
Average population served by each bed	8,258	8,052

The responsibility for providing medical relief in rural areas rests primarily on the local bodies, viz., the district boards, municipalities, etc. They are doing their best with the aids received from the Government and the charitably minded persons of the country. The funds at the disposal of these local bodies are not, however, elastic enough to admit of very speedy expansion of the medical relief work to meet the needs of the rural areas. It is, however, gratifying to note that, in spite of difficulties, charitable institutions in the rural areas increased during the last eight years by an average of twenty-six institutions per year.

Collaboration of Medical and Public Health Work.

To assure the best achievement in the field of the health work in the rural areas, this point is a very important one. It is satisfactory to note that the matter has already engaged the attention of the local Government, and the proposal for the employment of qualified medical practitioners with a course

of training in sanitary work, in place of the present sanitary inspectors now in charge of the public health units in the rural areas, has been recently under the consideration of the Government. It seems that the ultimate goal should be to have a medical man available for every union board or a group of villages, who will be a guide to the people of the locality in matters not only of prevention but also of cure.

Personnel.

(a) Doctors.

The doctor in charge of a hospital or dispensary is a qualified medical man, either a graduate or a licentiate in accordance with the size and importance of the institution and the financial means of the authorities responsible for its maintenance. Their primary duty is to supply medical relief to the people who attend the dispensaries or hospitals at the appointed hours. At other times, they are allowed to attend patients at their homes by way or private practice. Qualified private medical practitioners are also available, but they are more inclined to settle in towns and in areas with facilities for an urban life.

There are about 5,000 qualified medical practitioners in the rural districts. Their proportion works out to one per 9,776 people. The proportion and distribution are by no means satisfactory and call for improvement. The numbers of medical graduates and licentiates passing out from the medical colleges and schools in Bengal were 148 and 381 respectively during the triennium ending 1934, and this does not appear to be altogether an unsatisfactory state of affairs so far as the supply is concerned. If, therefore, the conditions of the rural areas can be improved and the financial resources of the people so enhanced as to make professional practice in rural areas more remunerative and attractive, one can reasonably expect to see more doctors settling in villages than creating congestion and unemployment in the towns.

(b) Auxiliary Staff.

As stated before, every hospital or dispensary is under the charge of a qualified medical practitioner. He is generally assisted by a compounder or a dresser for dispensing and

dressing work respectively. In comparatively small outdoor dispensaries, the dressing and the compounding work is done by the medical officer himself.

In the larger institutions having indoor accommodation, such as those at the district and subdivisional headquarters, there are in some places qualified nurses, midwives or dais, but their number is far too inadequate. In most places, the nursing work is left to the care of untrained female attendants and dais or relatives of the patients. This state of affairs is no doubt unsatisfactory, and the question of providing adequate nursing arrangements in hospitals, both town and mufassil, has become a serious problem. The cause is attributed to the meagre resources of the hospitals on the one hand and the scarcity of trained nurses on the other.

The Bengal Nursing Act, which was passed in 1934, made it possible for the Nursing Council to be formed. It is therefore hoped that ways and means will be devised soon to solve this difficult but very pressing problem.

Curative Activities.

It would appear that the ideal to be sought in the future would be to develop areas of the country which could be served geographically by a central, well-equipped hospital, and, based on this central unit, a network of dispensaries and small hospitals of the cottage hospital type to serve the rural areas and needs of the rural population, but to have always at their command the central hospital to deal with the more difficult and complicated cases which cannot be satisfactorily treated either at a dispensary or small rural hospital. Such a well-thought-out decentralisation scheme in the province would diminish the influx of patients into the large towns of the Presidency, where the question of finding adequate accommodation for them at present is developing into a very acute problem. These dispensaries and small hospitals should be so distributed that every union board or group of villages should have one of its own in charge of a qualified medical man. They might be of a simple nature and run as economically as possible, so that the cost may be within the means of the local people.

Medical Personnel.

The medical personnel in the province consists of :

- (1) Service men, I.M.S., B.M.S., I.M.D., and sub-assistant surgeons ;
- (2) Private practitioners, which fall under three categories :
 - (a) University qualified men and women ;
 - (b) Membership qualification of the State Medical Faculty, Bengal ;
 - (c) Licentiate qualification of the State Medical Faculty, Bengal.

This very unsatisfactory state of three grades of medical practitioners is now receiving very close attention, and it is to be hoped that, in the near future, this anomaly will cease to exist and that all practitioners will receive an education that may be accepted as a world standard of medical education.

For university medical education there are two recognised and affiliated colleges—the Government Medical College, with about 700 beds, and the Carmicheal Medical College, a non-Government institution with 360 beds. Both are, however, deficient in nursing. These two colleges turn out, on the average, 148 qualified medical men per year. In Bengal, there are at present about 3,505 M.B.s on the register.

State Medical Faculty.

This institution turns out two types of medical men :

- (a) Members who pursue a course somewhat analogous to the university curriculum, and
- (b) Licentiates who at present do a four-year course.

Affiliated to the State Medical Faculty are certain schools, Government and private, each with a hospital where training is carried out (in Calcutta, Dacca, Mymensingh, Burdwan, Chittagong and Jalpaiguri). These schools turn out about 350 licentiates per year.

Some of these schools leave much to be desired as regards equipment and teaching staff, and it is hoped that, before long,

these may be raised to a much higher standard. The total number of licentiates on the register at present is about 5,514. The whole question of the improvement of rural medical education in the future is one of paramount importance.

The members of the Bengal Medical Service are recruited from the university graduates and sub-assistant surgeons from the licentiates. The strength of these two services are as follows : Bengal Medical Service, 169 ; sub-assistant surgeons, 279.

Nursing.

Here, again, there are different standards.

(1) The senior nursing certificate obtained after four years' training at either the Calcutta Medical College or at the Presidency General Hospital. On an average, about sixteen pass out each year and are mostly absorbed into private work and hospitals as supervising staff.

(2) The junior certificate of nursing obtained after training for three years at one of eleven different institutions. The number that pass out each year is about thirty-one.

The midwife certificate (senior and junior) is granted after a course of training of not less than twelve months in a recognised institution of the State Medical Faculty. The number of the registered midwives in the province is about 800. Nursing facilities in the province are still undeveloped, but now that a Nursing Council has been initiated it is hoped that things will improve and the various standards at present existing will gradually be evened up ; but the time does not yet appear to have come when well-brought-up and educated women of the higher classes will take to the profession of nursing, and, until this evolutionary stage is reached, the nursing problem will remain unsolved. In addition to female nurses, some hospitals employ male nurses.

Compounders and Dressers.

The training of compounders consists of a two-year course, one year in a recognised teaching institution (medical school) and the second year of apprenticeship in a hospital or dispensary

recognised for the purpose. An additional course of training in a hospital for six months has to be gone through for qualifying for the dressership certificate. The examinations are conducted and requisite certificates granted by the State Medical Faculty, Bengal. There are over 2,800 compounders and dressers in the register maintained by them. The position of the compounder is also far from satisfactory, and it is hoped that before long his status will be improved, coupled with a better education and training.

SPECIAL HOSPITALS AND SCHOOLS (IN CALCUTTA).

School of Tropical Medicine.

(See Section 13 of Colonel Russell's report and note of Colonel Chopra, page 43.)

The All-India Institute of Hygiene and Public Health.

(See Section 14 of Colonel Russell's report.)

Arrangements for Tuberculosis Patients.

The existing facilities for the accommodation and treatment of tuberculosis patients in the province are far too inadequate to meet the actual needs, and the necessity for a tubercular sanatorium with large accommodation is very keenly felt.

Mental Hospitals.

There is no recognised mental hospital in Bengal. The only institution of the kind is the Mental Observation Ward, Bhowanipore (Calcutta), where patients are received purely for observation purposes. Patients certified after observation at the institution are sent to the Ranchi Mental Hospital, where accommodation is available for 1,000 patients from Bengal, on payment of a contribution by the local government. The accommodation, however, is very limited, and the need for some other arrangement for the accommodation of more mental patients is keenly felt.

Pasteur Institute.

The Pasteur Institute, Calcutta, serves as a treatment centre for antirabic work as well as a manufacturing centre of vaccine for supply to the other outlying centres in the districts. There are at present over 150 centres in the districts. During the year ending December 1935, 4,890 courses of treatment were sent to out-stations, and the number combined with that at the institute itself amounted to 5,723. The total amount of vaccine manufactured was 467,780 c.c. and the number of medical officers trained in the technique of treatment was, up till then, twenty-six.

Decentralisation has greatly improved the facilities for the treatment of patients all over the province.

Tuberculosis Association of Bengal.

(See following report of the Director of Public Health.)

Red Cross.

The contribution of the Indian Red Cross Society in the relief of sickness and suffering in India is well known. The Bengal branch of the society is working for the furtherance of the aims and objects of the society and has for this purpose organised its work in the following divisions :

- (1) Red Cross Military Division (literature for troops section) ;
- (2) Red Cross Hospitals Division (civil and military hospitals) ;
- (3) Red Cross Health Welfare Division ;
- (4) Junior Red Cross ;
- (5) The Ambulance Division.

Mission to Lepers.

Two hospitals, one at Ranigunj (Burdwan) and another at Bankura, are maintained for the treatment and accommodation of lepers by this mission, with funds raised by subscriptions

and aid from the Government. There is also another hospital at Gobra, Calcutta, which had hitherto been maintained by Government, but has, since 1935, been placed under a body of trustees. There are in all these hospitals over 580 beds and about 850 patients are annually treated there.

British Empire Leprosy Research Association.

The Bengal branch of the association carries on the campaign against the prevalence and spread of leprosy by means of propaganda and educative lectures, etc.

Association for the Prevention of Blindness.

This association, which was started over six years ago, has grown in its activities, which have recently been greatly stimulated by a large gift from Their Majesties' Silver Jubilee Fund. A travelling dispensary has since been started, which is doing curative work in the districts as well as propaganda work for prevention by instructive lectures and distribution of posters.

Budgets.

The total expenditure, as per the annual report of 1935, on the hospitals and dispensaries in the rural areas amounted to Rs. 28,47,865. The expense works out at about one anna per head of population per annum. Towards this expenditure, the Government contributed 12.58% of the total expenditure, local fund and municipal bodies 65.50%, hospital committees and charitable donations 14.10%, and the income from other sources, such as fees and contributions from patients and of interest on investment and sale on securities, etc., was 7.82%.

It is difficult to see how matters may improve unless more money be forthcoming by way of gifts and endowments from the charitably minded people of the province and larger contributions be made to the medical relief work by the local bodies, such as district boards and municipalities, etc.

To improve matters, the following suggestions are given :

(1) Improvement of facilities of communications by river, rail, road and possibly also by air ;

(2) Improvement of the general economic condition of the rural people and doing propaganda work to rouse in them a spirit and consciousness for medical relief work ;

(3) Establishment of dispensaries in every union or a group of villages for curative as well as preventive work under qualified medical practitioners with training in public health and sanitary work ;

(4) Formation of more special organisations for combating special diseases and further expansion of the work of those already existing.

B. PUBLIC HEALTH ORGANISATION IN BENGAL,

By

Lieut.-Colonel A. C. CHATTERJI, I.M.S., Director of Public Health,
Bengal.

I. HEALTH SERVICES.

The Public Health Department of this province is under the Director of Public Health, Bengal. There are four Assistant Directors of Public Health in charge of circles and one in charge of the malaria research. The Director of the Public Health Laboratory is also under him, and is assisted by a staff of technical experts.

There are three other laboratories under the Director of Public Health, each under a technically expert officer—viz. the Cholera Vaccine Laboratory, the Smallpox Vaccine institute and the Excise Laboratory. The publicity section of the Public Health Department is controlled by the Publicity Superintendent, Bengal.

The engineering branch of the Public Health Department, Bengal, is headed by the Chief Engineer. There are three executive engineers and three assistant engineers under him. The

engineering branch deals with the construction of sewerage, drainage, water supply and other projects.

The provincial administration of public health in the Presidency of Bengal consists of two main divisions—central and local—the former comprising :

(a) (1) *The central administration* consists of an administrative branch and an engineering branch. The former is under the Director of Public Health and the latter is under the Chief Engineer, Public Health Department.

(2) The present constitution of the Sanitary Board comprises the Local Self-government Department Secretary as its President, the Surgeon-General as its Vice-President, with four nominated official and six non-official members. The Director of Public Health and the Chief Engineer, Public Health Department, are joint secretaries in addition to being members.

The board is advisory to the Government and forwards all sanitary engineering schemes and other schemes having a bearing on public health to the local government with their recommendations.

The Surgeon-General and the Director of Public Health are under the Minister in charge of local self-government. Full collaboration of the two departments—the medical and the public health—is thus secured.

(3) The Port Sanitary Authority.

(b) *The local division* of the Public Health Department comprises local self-governing institutions—*e.g.* :

(1) The district boards,

(2) The municipalities.

(3) The Mines Board of Health, Asansol.

Some of the local bodies have analytical laboratories in which samples of foodstuffs, notified under the Bengal Food Adulteration Act (1919), are analysed.

The local bodies entertain sanitary staff—*e.g.*, health officer, sanitary inspectors, conservancy inspectors, food inspectors, vaccinators, epidemic doctors, etc.

With the inauguration of the rural public health organisation scheme in 1927, it has been possible to appoint a sanitary inspector, a health assistant and a carrier peon for each thana health circle. The area for these health circles coincides with the administrative thana area in most cases. The staff has thus been able to handle local outbreaks of cholera and other epidemics in villages. The appointment and dismissal of the staff rests with the district boards. The area of the health circle is roughly 100 square miles (varies from 40 to 406 square miles). In the large majority of thanas, the area is subdivided into union boards, each under a President. The union boards have been organised under the Bengal Village Self-government Act (1919). This Act gives some rudimentary powers to the union boards to tackle local public health problems. The Director of Public Health exercises advisory control over the local bodies. Thus it is seen that the Bengal Public Health Department is working on a decentralised system. All the district boards and the Mines Board of Health and a large number of municipalities employ medical officers for dispensaries and hospitals under their charge. While the work of the medical staff in charge of dispensaries purely under local bodies is supervised by the civil surgeon of the respective districts, the local bodies have powers to dismiss, appoint and transfer the officers. Since the public health staff is working under the same local authority, there is a certain amount of facility for co-operation of the medical and public health branches ; but, as a rule, the two departments have been working in more or less watertight compartments. There are about 1,343 hospitals and dispensaries and 575 public health circles in Bengal. An attempt was made to organise thana health boards with honorary members, but the scheme is not working well. Thus it has been found that a thana area should be the unit of rural public health organisation as at present. With the spread of education and more insistent demands on the services of the public health staff, smaller units may be created and the union boards may be adopted as units of public health organisation. The present organisation admits of such an expansion. The Bengal Village Self-government Act (Section 36) empowers the union boards to appoint their own staff for public health work.

The *collaboration of various departments*—e.g., health, education, veterinary, public works, etc.—is secured, as all the above services are within the scope and control of the district boards. The union boards are under the control of the district boards so far as public health is concerned (*vide* Section 27 of the Bengal Village Self-government Act.) The Mines Board of Health is a body solely entrusted with the sanitation of the mining settlement.

Personnel.

(a) *Doctors.*

There are seven medical schools and one medical college under Government control and a medical college and three medical schools under private supervision. The standard of examination is the same for all the schools. A qualified medical man is available on a pay of Rs.40 per mensem. The medical school students have to appear at the examination held by the State Medical Faculty. Qualified candidates are eligible to register their names under the Medical Registration Act. The course covers a study of four years. The students of the medical colleges have to appear at the M.B. examination of the Calcutta University.

A qualified medical man having a qualification of “Licentiate in Medical Faculty” can be appointed as a sub-assistant surgeon in Government service and as local Indian doctor for dispensaries under the management of the district boards. The medical graduates of the Calcutta University are appointed as assistant surgeons. A student, after qualifying himself as L.M.F., may get admission into medical colleges.

An attempt has been made by district boards to induce qualified practitioners to set up practice in villages by giving a subsidy. Subsidised dispensaries have been established. The medical officer who does not get the time-scale pay of other medical officers in charge of dispensaries whose services are transferred has to build his own practice and his services are not transferable. The subsidy for treatment of kala-azar and leprosy cases granted by the district boards has been sufficient allurements for many to establish their practice in villages. The district boards are pursuing a policy of providing at least

one dispensary for each thana. The village dispensaries have been started by union boards to attract medical men to villages. With the grant of the Government of India for rural reconstruction and uplift, a scheme for provision of village dispensaries has been adopted (*vide* Bengal Government, Local Self-government Department Circular No. 2675-2679 P.H., dated November 9th, 1935). In spite of all this, there is still only one medical man available for every 9,000 persons in the province. This shortage of medical men is more acutely felt in the rural areas.

(b) *Auxiliary Staff.*

There is a demand for recruitment of nurses only for hospitals. There is no demand as yet for nurses in the villages. This is mainly due to ignorance, and I am sure, the people would appreciate the services of a nurse if she is appointed. It has been a common experience that the compounder of a dispensary, on being dismissed from service, or leaving the service of local bodies, starts private medical practice. The country being poor and the attendance of the compounder practitioner being cheap, they enjoy a good income from practice. It has become difficult for the qualified medical practitioners to establish their practice owing to these men and other quacks. A nurse should not be turned into a quack lady doctor. The duties of the nurses should be limited to bandaging and dispensing a few harmless medicines. The treatment by quacks is responsible for many deaths.

With the spread of education, the religious prejudices are slowly vanishing in this province. Grant of scholarships and subsidy to trained midwives to establish their practice, the establishment of maternity and child welfare clinics in a village or a group of villages may attract young girls to this profession. The Bengal Public Health Department has a scheme of training of indigenous dais. It is hoped that, as a result of holding of baby-week exhibitions, a demand will be created in the near future for trained midwives and female health visitors. In a rural area in Faridpur district, a maternity centre has been opened and a trained lady health visitor has been appointed.

Money was raised by local contribution. The work is being supported by the Indian Red Cross Society.

Preventive Activities.

The inauguration of the Bengal rural public health scheme has extended the scope of preventive medicine for the benefit of the villages. The principal diseases of different localities should be taken into consideration, and special medical officers for treatment of the important prevailing diseases, such as leprosy, kala-azar, etc., should be appointed. The epidemic nature of the disease should be considered. It will be cheaper for the administration to maintain a mobile staff which will prove economical. For diseases that do not require the constant attendance of the medical officer—*e.g.*, kala-azar, leprosy, tuberculosis, etc.—several treatment centres may be placed under one officer. Treatment should not be made costly, and medical officers should not be made, in effect, selling agents of medico-chemical firms and laboratories. Indigenous medicine should be revived as far as possible and a pharmacopœia suitable for domestic purpose developed. Owing to the cheapness of drugs, the aurvedic, the unani, the homœopathic and other systems of treatment have maintained their existence.

Budget.

	Rs.	Rs.
Total actual expenditure in the public health budget for 1934/35 .	30,20,243	
Total actual expenditure in the budget of the Chief Engineer, Public Health Department, for 1934/35	5,39,477	
Expenditure " Medical " for main- tenance of bacteriological labora- tory and Calcutta Pasteur Institute in 1934/35	53,220	
	<hr/>	36,12,940

	Rs.	Rs.
<i>Brought forward</i>		36,12,940
Expenditure incurred by district boards on rural areas in 1934/35 :		
General medical establishment	89,741	
Hospitals and dispensaries	14,32,401	
Vaccination	2,43,460	
Sanitation	17,98,490	
Other contributions	80,773	
		<hr/> 36,44,865
Total of public health budget (provincial) and district board expenditure on medical and sanitation		<hr/> 72,57,805
Total expenditure on the head public health alone incurred by district boards in 1934/35		20,82,992
Total expenditure on the head " Medical " incurred by the district boards in 1934/35		15,61,873
Expenditure on public health (provincial and district boards)		56,95,932
Total expenditure on medical establishment by district boards and charges under the head " Medical " included in the budget of the Public Health Department		16,15,093
Charges for the engineering establishment of the Public Health Department		5,39,477
Population of rural areas (census 1931), 46,389,495.		

The cost per head of population for public health in 1934/35 was 1 anna 11½ pies, or 2 annas approximately.

The cost per head of population in 1934/35 on the heads public health and maintenance of hospitals, dispensaries, etc., by district boards was 2 annas 6 pies only.

The cost per head of population in 1934/35 on the heads public health, inclusive of engineering, was 2 annas 9 pies only.

In this connection, it should be mentioned that the charges on account of sanitary engineering projects were incurred more for sanitation of urban areas than for rural areas.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION. ¹

An intensive propaganda campaign is carried out in Bengal by twelve cinema parties of the Bengal Public Health Department. In three years (1933-1935), 5,739 shows were held and 5,800,000 people attended. Two district boards have purchased cinema apparatus; magic-lanterns have been purchased by all district boards for educative propaganda. No opposition is felt to the adoption of emergency measures; the way has been paved by the intensive educational campaign. The study of hygiene has been made compulsory in schools, and it is hoped that the active co-operation of the students will be available in future. But this training in schools alone cannot be expected to give the best results, as only a small fraction of the population reads in school, primary education not being compulsory in Bengal. Training of the women is undertaken by several private organisations—*e.g.*, the Saroj Nalini Society, the Social Service League, etc.

Unless marketing facilities increase and the economic condition of the cultivators is improved, it will be difficult to convince them on the usefulness of the co-operative movement. The economic aspect of the subject is intricately mixed with many other problems.

The Government of India made a grant of a sum of money for rural reconstruction and uplift. Rs. 1,08,900 was earmarked for the improvement of agriculture. Four hundred and fifty union board agricultural farms were established, each with an area of 8 acres. These farms are under the supervision of officers of the Agriculture Department. Six farms within a radius of 5 miles have been placed under the direct supervision of a demonstrator; the following crops were grown, paddy, napier grass, sugar-cane, ground-nuts, jute or fibre crop suitable for the locality, potato, gram, lentils, linseed, tobacco and vegetables. The Department of Agriculture has instructed the peasants on the improved method of preserving the manure. With the money sanctioned for the improvement of cattle, 1,000 bulls

¹ See also Notes C and D on Education and Co-operative Societies.

were distributed to ten districts—viz., Nadia, Murshidabad, Bankura, Hooghly, Rajshahi, Malda, Dacca, Faridpur, Tippera and Noakhali. Napier grass will be grown on one bigha of land in all the union boards in which a bull has been supplied. With the money allotted for the improvement of water supply, the sinking of a tube well had been recommended in every endemic cholera village. The local Government has approved of a loan policy so that the district boards may get loans at a cheap rate of interest for an intensive scheme of water supply.

From the grant for rural reconstruction, village dispensaries have been started.

There were seventy-two village dispensaries and 181 union board dispensaries in 1935.

Co-operative Activities. — A short note on the activities of the Co-operative Department by the Registrar of Co-operative Societies, Bengal, is affixed.

A report on the activities of the Education Department by the Director of Public Instruction, Bengal, is appended.

III. SANITATION AND SANITARY ENGINEERING.

Housing.

The necessity for a better standard of houses is only felt when the people are sufficiently educated. To educate the mass in the efficacy of cross ventilation, light, etc., magic-lantern demonstrations are given. The general standard of houses is poor in structure, but not so very bad from the point of view of general sanitation, although it must be admitted that houses admit of considerable improvement. Poverty has stood in the way of construction of better accommodation in many instances. Huts in Bengal villages often have windows; the huddling of animals and human beings in the same compartment is not so frequent a sight in Bengal. Santals and other people with a low standard of living have not appreciated the utility of windows. Thus, in the mining district, the “Dhaoras”, or the coolie lines, were provided with windows

high enough to be out of reach of the people, but it is often seen that the windows are closed by bricks or other materials, preventing ventilation.

Water Supply.

The Chief Engineer, Public Health Department, has recommended the sinking of tube wells by a special method.

House Sullage and Refuse.

For the disposal of house sullage, a type of soak-pit or closed cesspool was found very useful. Such soak-pits have been recommended by the Public Health Department in many places.

The disposal of refuse by the compost system was tried. It was found very convenient, but it was a source of fly-breeding in a particular season.

The domestic type of septic-tank latrine is advocated by the Public Health Department. Many such latrines have been constructed in the Kalimpong Settlement area. Domestic septic-tank latrines have been constructed by private engineering firms.

No special campaigns against flies are undertaken. It has not been possible to set up incinerators in villages.

Bored-hole latrines have been constructed in many tea estates.

Engineering projects undertaken for the benefit of the health of rural areas have already been mentioned.

IV. NUTRITION.

A diet survey was undertaken, and, from the data collected, charts have been drawn up for a balanced diet at a moderate cost. For the prevention of epidemic dropsy, a change of dietary is advised. A standard diet chart for prisoners in jails has been drawn up. A chart on the vitamin value of foodstuffs has been printed and circulated through the district boards.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

For the control of malaria in a municipal area, a grant is made by the local Government. The grant is on a 50% basis—e.g., Dacca anti-malarial scheme, Santipur anti-malarial scheme, etc.

For rural areas, free quinine distribution is advocated. The local Government makes an annual grant of quinine through the civil surgeons for charitable institutions in each district. Similarly, a supply is made to the district boards, who have to make purchases of quinine from the Government quinine depot. The free supply of quinine for distribution bears a proportion to the quantity purchased in the previous year. The proportion varies. The grant is made for free distribution through district anti-malaria societies, kala-azar treatment centres, union boards, sanitary inspectors and other allied institutions under either the control or supervision of district boards.

In five selected thanas where the incidence of malaria was heavy, the local Government has sanctioned free distribution of quinine for three years.

An experiment on the usefulness of plasmochin in combination with quinine was tried in an endemic area for malaria for three years.

In the suburb of Calcutta and the industrial town, Budge Budge, and in the industrial rural area near Changail, effective larvæcidal work to stop the breeding of *Anopheles ludlowii* and other malaria-carrying mosquitoes is undertaken by the Bengal Public Health Department.

The malaria research bureau has two outlying field laboratories at Sonarpur (District 24 Parganas) and at Saili (District Jalpaiguri). There is a central laboratory at Calcutta where research work is conducted. Mosquito larvæ and adults collected from malaria-affected localities are identified, blood slides of patients and persons with enlarged spleens are examined at the laboratory.

The malaria enquiry staff of the Public Health Department consists of one entomologist, one malariologist, three assistant surgeons, fifteen sub-assistant surgeons, six surveyors and two temporary entomologists. They carry out the survey of malaria-stricken localities, draw up anti-malaria schemes and watch the schemes put into operation.

For the control of malaria, flooding and flushing schemes with silt-laden water of the Bhagirathi was introduced at Jangipur Raghunathganj and other places. Subsoil drainage was undertaken in Minglas Tea Estate, while the scheme of locking up a stream and weekly discharge of the water thus collected to flush the bed of the sluggish stream in which mosquito larvæ were breeding was undertaken near Topsis-Singaram collieries, in the coal-mining district. There are hundreds of anti-malarial societies affiliated to the Central Co-operative Anti-malaria Society, Ltd., Calcutta. The central society works under the guidance of Rai Bahadur Gopal Chandra Chatterji, M.B., a retired assistant professor of pathology, Medical College, Calcutta. These societies are registered under the Co-operative Societies Act. They raise money to defray the cost of anti-malarial operations. Free grants of quinine are made to the society by the district boards. Selected societies get monetary help from the district boards and also from the Government. The proportions of grant are : 25% of the estimated cost must be raised by the society first by subscription, 25% to be paid by the district board in whose area the society is located, and the rest (*i.e.*, 50%) is borne by the local government.

Ento-ray apparatus is being given a trial in some of the malaria-affected localities. By magic-lantern and cinema shows, the people are instructed to use quinine. Anti-larval operations are shown in films and by actual operation by the sanitary inspectors and anti-malarial societies.

The cause and prevention of malaria forms a subject of study in primary schools. The young students are thus trained in their infancy how to escape an infection of the disease.

Medical institutions are turning out hundreds of qualified candidates. Many qualified candidates have settled in villages and thus the villagers are getting proper treatment. The

increase in the number of hospitals has contributed to the reduction of mortality from malaria.

Quinquennium	Average annual death rate per 1,000 population	Average annual fever death rate per 1,000 population	Average annual malaria death rate per thousand
1916-1920	32.11	24.37	No record
1921-1925	26.32	19.98	12.40
1926-1930	24.34	16.24	8.26
1931-1935	22.62	14.84	7.32

The cumulative effect of all the measures enumerated above is reflected in the lowering of the malaria mortality.

Plague.

There is no plague in Bengal.

Ankylostomiasis.

The patients are treated in hospitals. The Public Health Department staff apprise the public by cinema shows and magic-lantern lectures the nature, cause and prevention of the disease.

Tuberculosis.

With the exception of the activities of the Bengal Tuberculosis Association and a few other private institutions (*e.g.*, the Jaminibhusan Astanga Ayurvedic Hospital for treatment of phthisis, the Jadavpur Sanatorium, etc.), there remains very little to be said. The Bengal Tuberculosis Association was formed in 1929. This organisation trains health visitors, who make house-to-house visits and trace patients and contacts. The local government makes an annual contribution of Rs. 10,000 to the association. The Calcutta Corporation grants Rs. 5,000 annually to it. Contribution is also received from the Red Cross Society and the King George Thanksgiving Anti-tuberculosis Fund, Delhi. There are voluntary contributions to augment the fund. There are at present 30,000 patients in Calcutta and the bed accommodation has risen to 284 in Bengal. For want of dispensary accommodation, segregation at home

is advocated, and the health visitors attend the cases to see that medical instructions are properly carried out.

With the collaboration of the Surgeon-General and the Government of Bengal, it has been possible to trace out tuberculosis patients from the admission register at dispensaries. No survey work has yet been carried out with respect to this disease in a systematic manner in the rural areas. The sanitary inspectors in charge of rural health circles have been directed to trace the patients to their homes for necessary preventive work. Deaths from phthisis are also traced up to the affected families from the address recorded in the death register. Magic-lantern lectures are also delivered in the affected localities by sanitary inspectors.

Pneumonia.

Pneumonia is not a notifiable disease in rural areas of Bengal. As this disease is not a public health problem, no preventive work in this direction has been undertaken.

Yaws.

Yaws is almost unknown in the province, except in the Chittagong Hill Tracts, where it is known under the name Myang. Arrangements have been made for the treatment of the patients at dispensaries and also by an itinerant doctor. In 1934, 1,409 cases of Myang were treated, against 339 in the previous year and 71 in the following year (1935).

Leprosy.

Bankura and Midnapur districts have been surveyed by the workers of the British Empire Leprosy Association. Leprosy treatment dispensaries have been opened in both the districts. The incidence of the disease is low in other districts excepting Birbhum. In another area, leprosy has extended—it is the mining settlement of Asansol. There is an asylum for lepers at Bolumpur, Raniganj. The Mines Board of Health, Asansol, contributes towards the cost of maintenance of a ward for lepers.

The Bengal Government makes an annual grant of Rs. 5,500 to the Bengal branch of the British Empire Leprosy Relief Association for leprosy work.

Mental Diseases and Drug Addiction.

No steps are taken in the rural areas.

Smallpox.

A table of smallpox mortality in the province since 1928 is affixed. The figures are self-explanatory. The death rate per 1,000 population was 1 in 1928 against a rate of 0.1 in 1935. The vaccination figures show a district increase. In order to check epidemics of smallpox, emergency regulations were drafted under the Epidemic Diseases Act of India and were enforced in the affected areas. These regulations were found very useful. They make revaccination compulsory. It deserves mention that the Bengal Vaccination Act is in force throughout the province, but revaccination is not compulsory under this Act.

Vaccinations performed in Bengal Presidency (successful).

1928/29	1929/30	1930/31	1931/32
3,730,187	3,872,343	3,609,675	3,737,999
1932/33	1933/34	1934/35	1935/36
4,070,901	4,003,325	3,989,947	4,774,373

Quinquennium	Average smallpox death rate per 1,000 population
1916-1920	0.44
1921-1925	0.19
1926-1930	0.59
1930-1931	0.20

Cholera.

The appended tables show the cholera mortality in the province from 1928 to 1935. In 1920, district health officers were appointed. The rural public health organisation scheme was inaugurated in August 1927, but for paucity of qualified

hands all the thanas could not be provided with sanitary inspectors before 1929. The reporting of epidemic outbreaks improved to some extent. The mortality rate fell steadily from the year 1928 to 1933. There was, however, a definite increase in 1934 and 1935.

Cholera Mortality reported from the Districts (excluding Towns) of Bengal from 1928 to 1935.

	1928	1929	1930	1931	1932	1933	1934	1935
Deaths.	128,957	74,826	51,106	75,740	31,511	26,974	47,546	54,835
Ratios.	3.0	1.7	1.2	1.6	0.7	0.6	1.0	1.2

Anti-cholera Inoculations reported.

	1929	1930	1931	1932	1933	1934	1935
	1,566,150	1,021,541	1,829,022	952,105	1,036,643	2,106,269	2,329,326

Steps taken for Early Notification of Cholera.

Delayed notification is reported to the sub-divisional officers and the chowkidars are punished. Rewarding the first informant of cholera and smallpox within twenty-four hours after the outbreak has been legalised under the Local Self-government Amendment Act (1932). The first informants are rewarded by the Asansol Mines Board of Health and by the Nadia District Board. Their examples are being emulated by others.

The sanitary inspectors submit weekly epidemic reports of the area in their respective charge to the health officer of the district. The district health officer compiles a consolidated figure for his district, including figures received from the municipalities in the district, and submits a return to the Director of Public Health. A provincial weekly epidemic return is compiled at the office of the Director of Public Health and a copy is sent to the Public Health Commissioner with the Government of India and to other authorities for their information.

The chief anti-cholera measures that are employed may be classed as follows :

- (1) Disinfection of the excreta of cholera cases and soiled clothes.

(2) Sterilisation of suspected and polluted sources of water supply.

(3) Anti-cholera inoculation.

(4) Preventive treatment by essential oils.

(5) Education of the population, specially in regard to the need of immediate notification of cholera cases, the boiling of drinking-water, careful cleansing of the hands of all cholera contacts, protection of foodstuffs, particularly cooked ones, from flies. Publicity by magic-lantern lectures, distribution of posters and leaflets, radio talks, etc.

(6) In areas specially affected by water scarcity, strenuous endeavours are being made to increase the supply by sinking tube wells.

(7) Steps are being taken to improve the water supply of endemic cholera villages. For this purpose, spot maps of cholera have been prepared for each thana health circle, and the local Government made a grant for improvement of water supply of such villages (*vide* L.S.G. Dept. Public Health Circulars Nos. 2675-2679 P.H., dated Calcutta November 9th, 1935).

(8) Anticipatory inoculation with cholera vaccine.

(9) The disinfection of sources of water supply against apprehended outbreak of cholera in endemic villages.

To check serious outbreaks of cholera in any area, the Government of Bengal has passed regulations under the Epidemic Diseases Act. These regulations are being enforced in highly affected districts.

It deserves mention that cholera “Bili-vaccine” and “Ina vaccine” were tried, but the results have not been encouraging. Anti-cholera vaccine gave better results than the said products.

Pilgrim centres (*melas*) are often associated with outbreaks of cholera. There are two *melas* (festivals) in Bengal that deserve special mention—viz., the Ganga Sagar Mela and the Nagal bund fair. Special arrangements are made for water supply, conservancy and medical treatment. Cholera and smallpox cases are segregated; contacts are protected by inoculation against cholera and vaccination against smallpox.

Chlorinated water is supplied from district board reserve tanks, and the water is distributed through mains to galvanised-iron cisterns, which are provided with push-cocks for delivery. The Haj and Puri pilgrims are protected by anti-cholera inoculation and vaccination against smallpox. Returning pilgrims suffering from cholera or smallpox are segregated in Howrah and Calcutta Hospitals for treatment.

C. NOTE BY THE DIRECTOR OF PUBLIC INSTRUCTION,
BENGAL.

Omissis . . .

The Bengal Training Centre in Physical Education was established in the year 1932 to meet the growing demand in schools and colleges for teachers with special knowledge in physical education. Since then it is being continued from year to year on a temporary basis. In the training centre, teachers of all kinds of institutions get themselves well equipped with knowledge in physical education.

Grants are distributed to both boys' and girls' schools and madrasahs for purchase of games apparatus from year to year. Grants are also distributed to inter-schools sports associations every year with the object of creating in boys a liking for sports and games.

Steps have already been taken to appoint sub-inspectors of schools for physical education :

(a) For organising co-operative societies among schoolboys for sale and purchase of books and other school requirements ;

(b) For establishing inter-schools sports associations in districts, sub-divisions or other areas where none exist ;

(c) For conducting short courses of training for Middle English and Guru Training School teachers according to syllabuses drawn up by the physical director ;

(d) For introducing healthy social work among school-boys ; and

(e) For organising rural communities and rural uplift work by schoolboys.

In the curriculum for primary schools in Bengal, there is provision for the teaching of hygiene to the children at school. It is difficult to say how far this teaching will succeed to eradicate the unhygienic habits that prevail in the villages of Bengal. There is another factor which must also be taken into account, and that is the economic condition of the people who resort to these unhygienic habits. Unless there is improvement in that condition, no amount of teaching in schools will avail. The best course would be to supplement this teaching by a health propaganda by means of radio talks, cinematograph, magic-lantern and other ocular demonstrations. Such propaganda will be a part of the rural reconstruction scheme and will stimulate the teaching of hygiene in schools. In the new syllabus for primary schools, the teaching of hygiene has been included under the head "Elements of Science" in classes II, III, IV.

D. NOTE ON WORKING OF CO-OPERATIVE SOCIETIES CONNECTED WITH RURAL UPLIFT IN BENGAL.

By

THE REGISTRAR OF CO-OPERATIVE SOCIETIES,
Bengal.

Until the year ending June 30th, 1927, the work of rural reconstruction through co-operative societies was undertaken on a very limited scale. Three types of societies were in operation for the purpose—viz, (a) anti-malarial societies, (b) colonisation societies and (c) irrigation societies.

(a) *Anti-malarial Societies.* — The activities of the anti-malarial societies were directed mainly to clearing jungles, constructing drains and village roads and combating the spread of preventable diseases, such as malaria, cholera, kala-azar, etc. Some of the anti-malarial societies organised under the auspices of the rural reconstruction department of the Viswa-bharati, founded by Dr. Rabindranath Tagore at Bolepur, in the district

of Birbhum, expanded their activities to various spheres of rural uplift, such as reclamation of old tanks, improvement of agriculture, introduction of spinning and weaving as subsidiary occupation amongst the agriculturists and the opening of primary schools for imparting elementary education. The other primary anti-malarial societies more or less operated in various areas adjacent to the district and sub-divisional headquarters, and, until the end of the year 1935, were more or less restricted to urban-minded population. The real rural areas where unhygienic habits prevail and where the standard of living and education are very low could not be reached owing to paucity of adequate departmental staff to do the necessary initial propaganda. A scheme for the uplift of the agricultural masses by awakening in them the reality of their condition, inspiring them with an abiding desire to improve their conditions and training them to work together on a co-operative basis has been formulated and put into action in the last year. The activities of a rural reconstruction society in this scheme will consist of three broad divisions—viz, (a) economic, (b) sanitary and (c) educational. The economic side of this scheme seeks to improve the income of the villagers by introducing subsidiary occupations within their means, such as kitchen-gardening, poultry-farming, weaving, crop-planting and cattle-rearing. The sanitary side consists of an Advisory Board formed of a few leading villagers and other influential members, which initiates measures for the improvement of the sanitary condition of the village according to its particular needs. All measures for improving the village sanitation are carried out by voluntary labour contributed by the villagers themselves. The programme of work mainly consists of providing pure water, clearing jungles and removal of water hyacinth. Sports and other healthy outdoor and indoor exercises have been initiated and encouraged by this board. Arrangements have been made for compulsory vaccination of every householder in the village and the villagers instructed about the cheap and nutritious diet by means of easy and intelligible food charts. On the educational side, a night school for every village has been provided, for which a curriculum suitable for teaching the three R's to the ignorant villagers has been prescribed.

Every village coming under this scheme is required to construct a common village hall, where the members may have, along with recreation, demonstrations in weaving and primary education. Every villager is required to meet at the hall after his day's labour to discuss topics of local interest and utility.

As regards finance, the working of these societies will be strictly on the basis of thrift, self-help, self-determination and mutual aid. The expenditure has been based on what the cultivator can spare without any difficulty out of his small saving. The villagers are instructed how to balance their family budget. As an initial subsidy, seeds for vegetables and other agricultural produce, eggs for rearing poultry of superior breed and free instruction in the art of weaving, as well as elementary principles of hygiene, are given. The scheme has received considerable impetus during the last year owing to the co-ordinated efforts of the Co-operative, Agriculture, Public Health and Veterinary Departments, and the keen interest taken in the development of rural reconstruction societies by the district, sub-divisional and other local executive officers. The total number of rural reconstruction societies, including anti-malarial societies, is 1,425, with a membership of 36,567, in the Presidency of Bengal.

In addition to the rural reconstruction and anti-malarial societies mentioned above, the activities of the Central Anti-malarial Society at Calcutta may be mentioned in this connection. This society consists of both individual members and primary affiliated anti-malarial societies operating throughout the province. The total number of such affiliated societies at the end of the year June 30th, 1936, was 985. The management of the society is in the hands of a competent board of directors, some of whom are medical practitioners of high standing and repute under the leadership of Rai Bahadur G. C. Chatterjee, of Calcutta. The society has so far carried on useful propaganda in favour of effective measures against preventable diseases through its affiliated societies and has succeeded in focusing public opinion on the necessity of opening out numerous important waterways in the province which are at present dried or silted up.

(b) *Colonisation Societies.* — The activities of co-operative societies in reclaiming the Sundarbans for the purpose of forming a colony have been successful in Sir Daniel Hamilton's estate at Gosava (in 24, Parganas) and Badarkhali, near Chittagong.

The area reclaimed at Gosava comprises about 20,000 acres of land originally overspread by jungles and inundated with salt water at high tides. The entire area has been protected by raising embankments and converted into a profitable paddy-growing area on which landless cultivators have been settled. A Co-operative Central Bank, a consumers' store and a paddy sale society, with a rice mill as its annexe, have been started with a view to eliminating middlemen and moneylenders. These organisations are working satisfactorily. Primary education has been encouraged by the formation of primary schools subsidised by the estate, whilst efficient medical help has also been provided for. Arrangements have also been made for training people in improved methods of cultivation and also in weaving to provide subsidiary income. A Rural Reconstruction Institute has recently been started, where training in co-operative principles, practical agriculture, public health, etc., is being imparted to thirty students for the present.

The second colonisation scheme at Badarkhali covers an area of about 4,000 acres, which have been reclaimed and developed and have accommodated 1,500 families. The work of reclamation is still in progress, but it has even now achieved surprising results in improving local sanitation, imparting elementary education to the settlers and gradually teaching them the benefits of thrift and self-help.

(c) *Irrigation Societies.* — Although irrigation occupies an important place in village reconstruction, it has so far been possible to form such societies in the dry districts of Bengal, such as Bankura, Birbhum, Midnapur, Howrah and Burdwan, with the assistance of a special staff of inspectors and supervisors provided by the Government for the purpose in 1934. Co-operative societies have been formed mainly for reclaiming old and unhealthy tanks to irrigate the fields of the local villagers in return for a suitable water cess, and in doing so

have contributed to the improvement of local public health. There are a few major schemes by which masonry weirs, sluices or dams across small perennial streams to cater for the irrigation needs of the neighbouring villages have been set up. The main direction in which these societies have been useful has been to improve the yield of the agricultural produce of their members and thereby their economic condition. The total number of such societies at June 30th, 1936, was 942, with a membership of 20,689, and the total irrigable area served by them was 141,008 bighas (1 acre is about 3 bighas).

The activities of other classes of societies in this direction also deserve mention. In the Barasat sub-division of the district of 24, Parganas, the primary co-operative milk societies have introduced various measures for the improvement of local sanitation by sinking a large number of tube wells, opening a well-equipped veterinary dispensary and maintaining stud bulls for the improvement of the strain of cattle. These works are maintained by means of contributions out of the profit of these societies.

The Naogaon Ganja Cultivators' Co-operative Society, Ltd., in the district of Rajshahi, which has been given the monopoly for the sale of ganja and bhang for the provinces of Bengal and Assam, has also contributed substantially to rural reconstruction in the locality. It spends large sums annually for this purpose and maintains dispensaries for the medical aid of members and the treatment of their cattle. It has also made arrangements for the primary and secondary education of the members residing within its area of operation and maintains three English high schools and a number of primary schools. The society has budgeted to spend during the year Rs. 17,500 for medical, veterinary and educational purposes.

14. NOTES ON MEDICAL AND PUBLIC HEALTH ORGANISATION IN BIHAR.

Area : 69,348 square miles.
Population : 32,371,434.
Districts : 16.

A. MEDICAL ORGANISATION IN THE PROVINCE OF BIHAR.

By

Colonel P. S. MILLS, I.M.S., Inspector-General of Civil Hospitals.

The Inspector-General of Civil Hospitals is the administrative head of the Medical Department and is adviser of the Minister of Local Self-government on technical subjects. A civil surgeon is in medical charge of each district. The duties of the civil surgeon, or, as he is called in many other provinces, the district medical officer, are multifarious. He is in full charge of a large hospital in the headquarters town of the district and is also the superintendent of the district jail, which may accommodate a number of prisoners varying from 100 to 500. He is the general inspecting and advisory officer for a number of hospitals, indoor and outdoor, scattered throughout the district. These vary in number and may be as many as fifty or sixty in a single district. He inspects these hospitals periodically. He is also in sanitary charge of the district and is responsible to the Government for such public health measures as vaccination, control of epidemics, etc.

Small hospitals of the district are in medical charge of doctors who may be graduates of a medical college (assistant surgeons), or of doctors who have done a four-year course at a medical school and hold the qualification of L.M.P.—*i.e.*, licensed medical practitioner (sub-assistant surgeons). All the dispensaries are in charge of paid doctors. There are several mission hospitals in the province doing excellent work, and the devotion of the medical missionaries in charge of these hospitals deserves the highest praise.

The headquarters hospital of the district has generally a nursing staff of very fair efficiency, but, unfortunately, the number of nurses is rarely as great as it should be. A certain number of small hospitals have trained nurses, but not more than one per hospital.

The total number of hospitals and dispensaries in the province of all classes is 564—viz, urban 90, rural 428 and, railways 49. Of these, 38 are maintained by Government, 17 are aided by Government and 460 are maintained by local bodies and private individuals. The total number of patients treated in all classes of dispensaries in 1935 was 6,277,314.

The number of medical officers of different classes in the province in 1935 was 858, out of which 653 belong to the sub-assistant surgeon class.

Nurses :

(a) European and Anglo-Indian	170
(b) Indian	147
Midwives	66
Dais	80
Compounders	653

The system of settling subsidised doctors in rural areas has not proved a success up till now, and there are only seven doctors of this class, two in Champaran, one in Prunea and four in Manbhum.

Medical Education.

The educational standard in the Medical College at Patna and in the Medical School at Darbhanga is high, and post-graduate classes of the greatest value are held in these institutions every year.

Nurses and midwives are trained in the larger hospitals and are employed mostly in towns. There are a few nurses working or practising in rural areas. The problem of medical aid in rural areas has still to be solved, as those areas do not yet generally attract medical men in private practice. With the

limited resources at the disposal of the Government, it is not possible to provide dispensaries in every quarter, and unless local efforts are made by the people themselves, it may take a very long time to reach a state of efficient medical aid for the whole population residing in rural areas. The great majority of the rural population still relies on the indigenous systems of medicine and on home remedies for its medical relief, and not on Western Medicine as practised in the hospitals enumerated above.

Budget.

The total amount of expenditure on State public, local fund, private aided and subsidised hospitals and dispensaries during the year 1935 was Rs.24,44,055. The expenditure of the entire medical department by the Government in the financial year 1935/36 was Rs.20,80,926, including Rs.33,053 for Tibbi and Ayurvedic (the indigenous) schools. The expenditure on medical aid through the hospitals and dispensaries mentioned above works out at 1 anna 2½ pies per head of population in 1935.

In the larger hospitals, a high standard of treatment, both medical and surgical, is provided, but in the small dispensaries this is still rather primitive, and difficulty is experienced owing to lack of funds for provision of sufficient drugs—some, such as quinine for malaria and the antimony compounds for kala-azar and the arsenicals for syphilis, being items of high cost.

*Tuberculosis.*¹

There is a sanatorium at Itki with sixty-six beds for tuberculosis patients and only paying patients are treated in it. The sanatorium is being extended to accommodate sixty-two more patients. A large scheme to organise anti-tuberculosis work is under consideration, and it is proposed to establish an anti-tuberculosis association with a clinic at the headquarters of each district. Considerable funds are available, and it is hoped that, with some help from the districts, the scheme will mature within a year.

¹ For these items, see also Lieut.-Colonel PHILLIPS' report.

*Leprosy.*¹

Lepers are accommodated and treated in six leper asylums and thirty-seven leper clinics. Treatment for lepers is available in all the more important hospitals.

*Mental Diseases.*¹

There are two mental hospitals, one for European with 296 beds and the other for Indians with 1,380 beds. The European mental hospital receives patients from several other provinces, while the Indian mental hospital is shared between Bengal, Bihar and Orissa in the proportion of 75, 20 and 5% of beds respectively.

There is a Pasteur Institute at Patna for preventive treatment of persons exposed to danger of rabies and three sub-centres have also been inaugurated recently in districts and the intention is to have finally sixteen Pasteur centres throughout the province.

B. PUBLIC HEALTH ORGANISATION IN BIHAR AND ORISSA.

By

Lieut.-Colonel J. A. S. PHILLIPS, I.M.S., Director of Public Health.

N.B. — It is to be noted that Orissa has been separated from Bihar and made a separate province within recent months, but Colonel Phillips' note deals with both for reasons which he gives in the course of his note. Colonel Verghese, the new Director of Health and Prisons Services, Orissa, has submitted a separate note on Orissa.

Some of the districts of Bihar and Orissa were separated to form, with certain areas of the Madras Presidency and the Central Provinces, the new province of Orissa in April 1936.

As complete figures for Bihar only are not yet available, this report deals, in parts, with the old combined province of Bihar and Orissa.

¹ For these items, see also Lieut.-Colonel PHILLIPS' report.

I. HEALTH AND MEDICAL SERVICES : HISTORY.

Principles governing their Organisation and Personnel.

With the inauguration of the Montague-Chelmsford Reforms in 1919, medical relief and public health became transferred subjects, and were placed under an Indian elected Minister for Local Self-government. Extensive powers were transferred to the local bodies—*i.e.*, municipal and district board commissioners—and these bodies were made responsible to the Government for medical relief, public health and the prevention of disease.

The local government, with the co-operation and assistance of the Gaya District Board, initiated an intensive rural sanitation scheme in a limited area in the Gaya district. A Conference was convened shortly after (1921), at which representatives of the local bodies and Government officials, including the Director of Public Health, were present, to formulate a scheme for a public health organisation in the province.

The most important features of their recommendations were that, in rural areas, medical relief and public health were to be combined into one general public health organisation, and to be spread over the whole district; that, in addition to the medical men, there should be subordinate officers and a menial staff responsible for the sanitation of villages. Dispensaries were to be established throughout the district at centres which would afford medical relief to villages within a five-mile radius of the dispensary to begin with, and that the doctor in charge of the dispensary would also be responsible for all aspects of public health within his circle.

The Government, whilst appreciating the principle of economy underlying the recommendations, was somewhat sceptical of the wisdom of combining medical relief and public health to the extent the proposals envisaged. It was considered that, if public health and sanitation were to be supervised in the manner in which it should be by the dispensary doctor, he would be overburdened with work, and one or other side of these dual duties would suffer. It was also thought that the

average dispensary doctor was not sufficiently trained in sanitation and public health to be able to undertake these duties. Reports on the working of the Gaya scheme were not encouraging ; sanitation and public health were being neglected, and the doctors were devoting all their time to medical relief.

It was for these reasons that the Government considered that the recommendation for combining medical relief and public health to the extent suggested was not a practical proposition, and recommended certain modifications, which will be discussed later.

The Gaya experiment was allowed to continue, however, until in subsequent years this district decided to separate, to a great extent, its public health organisation from medical relief, and to model the former on the lines of the scheme suggested by the Government, which will be discussed later.

It was realised that there should be close *collaboration between the Medical and Public Health Departments*, and, as dispensaries exist in all parts of every district, it was decided that the local dispensary doctor should be held responsible for taking the first steps in dealing with the outbreak of an epidemic disease. For this purpose, each dispensary doctor was allotted a definite circle and made responsible for preventive measures against epidemic diseases in the villages within that circle. The size of the circle depended on local conditions, and was decided in each case by the sanitation committee of the district board.

On receiving information of the outbreak of an epidemic disease within his circle, the dispensary doctor was required to proceed at once to the affected village or villages, treat the cases, and carry out all necessary preventive measures. He was also required to send information of the outbreak of the epidemic to the civil surgeon of the district, the chairman of the district board and the health officer of the district board, if such an officer existed. He was required to keep in touch with the affected area until the epidemic subsided, or until relieved by the health staff of the district, where such staff existed. In cases of urgency, the doctor was authorised to close the dispensary and to concentrate his attention on preventive measures. It was considered by the Government that this was the limit to which the services of dispensary doctors could be

reasonably utilised without completely dislocating the work of medical relief in these dispensaries.

At the same time, a *model district health scheme*, which was to cost approximately Rs.20,000¹ was drawn up by the Government in 1924, and recommended to all districts for adoption. The Government also promised to pay half the cost of these health organisations up to a maximum of Rs.10,000.

In order to do this, the financial assistance which had been given so far towards the cost of a health officer in each of the larger municipalities had to be withdrawn, with the result that the municipalities concerned declared their inability to maintain health officers entirely at the expense of municipal funds, and most of the health officers were discharged.

To ensure the prompt reporting of outbreaks of epidemic diseases, it was recommended that the use of coloured postcards should be introduced to enable the village chaukidars to notify the dispensary doctor, the nearest police thana and the district health staff of the occurrence of these diseases. Postcards to the health staff were to be already stamped and addressed to the officer concerned, and all that was required was for the chaukidar to place them in the nearest post-box, the cards to the nearest dispensary doctor and the police thana were to be delivered by hand. A red postcard indicated the outbreak of cholera, a yellow one smallpox, and a blue one plague. It was the duty of the officer at the police thana to communicate the information forthwith to the authorities at headquarters of the district.

		Initial annual cost
		Rs.
¹ (1)	One health officer on Rs.300 - $\frac{25}{2}$ - 500	3,600
(2)	Four health inspectors on Rs.40 - 2 - 60	1,920
(3)	Twelve sanitary gangs at Rs.47 each per gang per month (each gang consisting of one mate at Rs.15, one disinfectant at Rs.12 and two sweepers at Rs.10 each per month)	6,768
(4)	Notifications, rewards, postage, etc.	2,000
(5)	Travelling allowance	2,400
(6)	Disinfectants and drugs	500
(7)	Contingencies	500
(8)	Office establishment (one clerk on Rs.40, six peons on Rs.12 each per month)	1,344
		<hr/> 19,032

If the report, on investigation, was proved to be a correct one, the chaukidar was to be rewarded with a sum of four annas, and provision was made in the budget of the model health organisation scheme for such rewards.

This practice is still followed in some of the districts. It was further suggested that full use should be made of teachers in primary village schools in employment under district boards, as reporting agents for the supply of information regarding the outbreaks of epidemic diseases and for rendering such aid as was within their scope—*i.e.*, disinfection of wells, etc.

This was regarded as a basic scheme, and district boards whose funds permitted of a more elaborate organisation were encouraged to employ assistant health officers for each subdivision of the district and to increase the number of health inspectors, so as to have one in every thana. The employment of a special officer for propaganda work was also recommended.

Ten districts accepted the scheme and started health organisations of their own with fully qualified health officers in charge. The Government contributed half the cost of these organisations to five of these districts. The world depression affected India also, and two of the districts which received no Government aid were forced to give up their public health schemes.

* * *

On April 1st, 1936, the five districts of Balasore, Cuttack, Puri, Angul and Sambalpur were shorn off the Province of Bihar and Orissa, and, with certain areas in the Madras Presidency and in the Central Provinces, were amalgamated to form the new province of Orissa. The public health staff employed in the above-mentioned districts, both Government and local board, were transferred to the new province. The Province of Bihar now consists of four divisions and sixteen districts, and the Government public health cadre of Bihar is as under :

- (1) Director of Public Health ;
- (2) Three Assistant Directors of Public Health ;

(3) Fifteen medical officers of health, including the leave reserve ;

(4) Four school medical officers ;

(5) One lady school medical officer ;

(6) One excise chemist ;

(7) One officer in charge of the manufacture of cholera-phage ;

(8) One chemical analyst for the public health laboratories ;

(9) One superintendent of the vaccine depot ;

(10) One publicity officer who is also the personal assistant to the Director of Public Health and Health Officer of New City Patna ;

(11) Four assistant school medical officers.

Ten districts of Bihar and six municipalities now have health officers, most of whom are paid for by the Government :

Two more areas within the province have maintained an efficient and well-organised public health staff—viz., the Jharia coal-mines area and the Tata iron and steel area at Jamshedpur.

The Jharia Mines Board of Health came into being under the Bihar and Orissa Mining Settlement Act of 1920. The jurisdiction of the Board extends to an area of 787.1 square miles and covers the whole of Dhanbad sub-division. The population of this area for 1934 was estimated to be 521,243. Of this number, 57,265 persons were employed as labourers in the mines.

The Board employs a fully qualified medical officer of health, who is designated the chief medical officer, who has also been appointed an inspector of mines under the Indian Mines Act of 1923 for this area.

Dwelling-houses of a type plan are provided for the labourers, and no such house can be occupied until it has been inspected and passed as fit for occupation by the chief medical officer. During 1934, 29,134 such houses were licensed.

Conservancy.

The area is divided into three sanitary circles, each in charge of a sanitary inspector. The Board maintains 120 public latrines for the use of the labourers in the mining areas. In some areas, where public latrines are not provided, trench latrines are in use. In outlying villages within the areas, a few bored-hole latrines have been recently sunk as

an experiment. Road and house sweepings are collected daily and conveyed to dumping-grounds in motor-lorries in the town of Jharia, and in buffalo and bullock carts in other places.

Water Supply.

The water supply comes from a lake some miles away, which has a large catchment area. The water is purified by means of sand filtration and is distributed from the main reservoir by means of pipes to almost the whole of the colliery areas.

Child Welfare and Maternity.

Three child welfare and maternity centres are maintained by the Board, each in charge of a qualified health visitor. Six whole-time midwives are also employed to conduct labour cases at homes of the labourers. During 1934, 251 labour cases were conducted by these midwives. Arrangements also exist for the training of the indigenous dais or midwives, and each dai, after passing the examination held at the end of the course, is supplied by the Board with a portable outfit.

Food Adulteration.

The Bihar and Orissa Food Adulteration Act is in force in the area and the Board maintains a well-equipped laboratory and has appointed a qualified chemical analyst, who analyses and reports on the water supply regularly. He is also required to examine and report on samples of foodstuffs collected under the Food Adulteration Act.

Leprosy Clinics.

Three outdoor leprosy clinics are maintained for the treatment of leprosy cases—namely, one at Dhanbad, one at Jharia and one at Katras. Each is in charge of a specially trained doctor. This is an example of what can be done in a rural area when funds are available.

Tata Iron and Steel Area.

The modern industrial town of Jamshedpur occupies the greater part of this area, which is 25 square miles in extent and has a population of 83,738. Rural conditions prevail beyond the town but within the area. The town itself is a model of an up-to-date sanitary town, with an excellent, pure, piped water supply, flushed latrines, well-controlled markets and a thoroughly efficient sanitary staff controlled by a fully qualified health officer. A large number of the labourers employed in the Tata iron and steel works and associated companies are accommodated in a good type of dwelling-house within the town, but a great many live in what may be described as modern villages built to some kind of plan by the people themselves with materials supplied by the company. There is plenty of space between the huts, a large central area with a properly constructed well, where the piped water supply is not available, and latrines for both males and females.

The Collaboration and Co-operation of the Medical and Public Health Services.

From what has been said when discussing these two organisations, it will be seen that, in this province, there is the fullest collaboration between the two departments. Dispensary doctors are utilised in the prevention of epidemic diseases, and in districts where only a limited public health organisation exists, the district medical officer controls both medical and public health activities.

The control of such diseases as leprosy and kala-azar is still vested in the Inspector-General of Civil Hospitals, who is also more directly concerned, at present, with child welfare and maternity centres than the Director of Public Health. It has been recently suggested that these activities should be transferred to the Public Health Department, where they naturally belong.

In districts where health officers now exist, these officers have been made the superintendents of vaccination; but, in districts where no health officers are employed, the district medical officers are still responsible for vaccination.

The district medical officers are still responsible to the Government for the health of the districts, and they are usually chairmen of the district board sanitation sub-committee. Health officers are requested to keep in close touch and work in co-operation with the district medical officers.

The Collaboration of Other Departments.

Since the creation of the public health services, efforts have been made to enlist the co-operation and support of the Department of Education,¹ through the agency of school-

¹ Tradition and caste prejudices die hard in a conservative country like India, and more especially in a backward province like Bihar and Orissa, where only 12.6% of the male population over 20 years of age can read and write.

There has been decided progress in female education within recent years, and, with the gradual disappearance of the pardah system amongst the higher and better educated classes, these prejudices will slowly disappear. Already, there is an increasing demand for medical education for women of the educated classes, and in the Patna General Hospital there are now fourteen Indian probationer nurses, some of whom belong to the higher castes.

teachers, both English and vernacular, in the dissemination of knowledge in the elementary principles of hygiene and sanitation. Early in the history of public health administration, the services of school teachers, more especially in rural areas, were requisitioned to report the immediate occurrence of epidemic diseases in villages, and to take such preventive measures against these diseases as lay within their power to perform. The introduction of school medical officers and the medical inspection of school-children afforded further scope for this co-operation. Headmasters and teachers are required to see that parents and guardians take steps to remedy the physical defects reported by the school medical officers. School medical officers are required to deliver a series of lectures on hygiene and the prevention of disease, illustrated with diagrams and lantern-slides to the students in the senior classes. Attendance at these lectures is obligatory and the teachers are also invited to attend. It might be mentioned here that the medical inspection of school-children on similar lines has been recently imposed as part of the duties of health officers of districts, where such officers are employed, and that these inspections are carried out by these officers in middle and primary schools in rural areas, the work of the Government officers being confined to high schools and middle schools in urban areas. During the school vacation period, arrangements are made, in consultation with the Director of Public Instruction and inspectors of schools, for the collection of school-teachers, more especially vernacular teachers from village schools, at convenient centres in the district, where school medical officers are required to deliver a course of popular lectures on public health subjects.

More recently still, there has been a closer co-operation between the Public Health Department and the Co-operative Societies Department. The advice of the former has been sought by the latter in questions relating to rural reconstruction. But this will be more fully discussed under the appropriate heading.

So far, there has not been much collaboration between the Public Health Services and the Veterinary Services or Animal Husbandry Departments. But, with the interest that is now being evinced in the improvement of conditions in rural areas, closer co-operation and collaboration between these departments may be anticipated.

Population, Area, etc., of the Province.

At the last census, taken in 1931, the population of Bihar and Orissa was recorded as 37,677,576. Of this population, 1,455,160 live in towns and 36,222,416 in 104,239 villages in rural areas. The total area of the province is 111,702 square miles. For this population and area, 226 graduates and 784 licensed medical practitioners were employed by the Government, local bodies, railway companies and private concerns, and it is estimated that, in addition to these, a further 600 registered medical practitioners are engaged in independent medical practice. A total of 1,610 medical men were available for a population of 37,677,576 in an area of 111,702 square miles, or roughly one medical man for a population of 23,402 and an area of 69.4 square miles.

This calculation will not bear scrutiny. Most of the graduates in medicine are employed in headquarters and sub-divisional hospitals, and the bulk of the independent private practitioners gravitate to towns, where conditions are easier and fees are paid in cash. Most of the licensed medical practitioners are in charge of dispensaries located in rural areas.

There is a glut of medical practitioners in towns, and a resulting struggle for existence with all the attendant evils of such a condition. Unemployment, or what is tantamount to unemployment in this struggle to earn a living in towns, is on the increase, and all inducements offered to qualified medical men to settle in practice in rural areas, so far, have been unsuccessful.

An attempt was made in 1920 to establish a series of *subsidised dispensaries* in larger villages or a collection of villages in the province. Several districts started these subsidised dispensaries, but, at the end of a year or two, they had to close down, as the medical men were dissatisfied with the conditions and refused to carry on. There are a few such dispensaries still in existence in one or two districts, and their number has increased in the last year or so. The unemployment amongst medical men was not so acute in 1920 as it is now, and, with a supply of doctors far in excess of the demand for employment in either Government or other service, this system of subsidised

dispensaries would appear to offer considerable scope for development in the future. It is again being brought to the notice of local bodies.

In all the calculations above, no consideration has been given to the rôle of the practitioners of the indigenous systems of medicine. They are not recognised by those who practice the Western system of medicine, they are not registered and no information is available of their numbers. That they do exist and practice in rural areas is well known.

Medical Education.

So far, the abolition of the medical schools, which turn out a cheaper but less efficient type of medical man, has not been seriously considered in the province. On the other hand, the question of raising the standard of medical education in these institutions has been discussed from time to time. The licensed medical practitioners are a useful body of men who have rendered devoted and loyal service in the past both to Government and local bodies. They are paid less than half the salary given to graduates and their fees for services rendered are proportionately smaller. They have for many years been employed in dispensaries in rural areas and seem to take to village life more readily than their better educated and more qualified confrères. But the supply of graduates in medicine from the Patna Medical College has already exceeded the demand for this class of medical practitioner, both in Government and local body service. The excess is struggling to earn a living in towns, but there is already evidence that these graduates will become serious competitors for employment in posts now held by the licensed medical practitioner, which might transfer the unemployment problem from one class of practitioner to the other.

What will save the situation will be the development of the scheme for subsidised doctors and subsidised dispensaries in rural areas, for which the licensed medical practitioner is eminently qualified. Recently, the Government has sanctioned the employment of licensed medical practitioners who hold the additional qualification of a license in public health as health officers of smaller municipalities. Several district boards

employ licensed medical officers as assistant health officers under their health officers. The advantages of this policy are obvious, for, in addition to attending to the sanitation and prevention of disease in rural areas, these men are able to carry out inoculations and treat cases of ordinary ailments in the villages.

Medical education for women in the province is gaining in popularity and, in 1936, six women of the required standard of preliminary education applied for and gained admission to the Patna Medical College and the Lady Hardinge Medical College at Delhi.

Auxiliary Medical and Public Health Staff

All villages in the province and, it must be admitted, most towns also, have their quota of indigenous dais or midwives.

It is one of the causes, and the chief one, of the high maternity and infant death rate.

Some of the district boards are endeavouring to arrange for classes of instruction conducted by a lady doctor, under the supervision of the health officer, for these women, not with any idea of teaching them midwifery, but merely to inculcate in them the elementary principles of cleanliness and hygiene, and to encourage them to apply to the nearest dispensary doctor for assistance in difficult cases of labour.

Compounders or Dispensers.

Most of the rural dispensaries have a fully trained compounder on its staff, who, in addition to dispensing the daily prescriptions, assists in dressing cases of injury ; 755 of these men are employed in the province. Classes of instruction for compounders are held in the two medical schools of the province, and these men are also trained in the large headquarters hospitals of each district and in certain other recognised medical institutions, and have to pass an examination at the end of the course.

Dressers.

In the larger rural dispensaries, dressers are also employed. As their name suggests, they are utilised for dressing surgical cases. They receive instruction in all the larger hospitals in the

province and have to pass an examination at the end of the training ; 455 are employed in the province. Some compounders also take the dressers course of training and are able to do both duties.

Maternity and Child Welfare Centres and Health Visitors.

Several of these centres are working in the province, in the larger towns. No centres have as yet been opened in rural areas.

Health Units.

In ten out of the sixteen districts in what is now the province of Bihar, there are fully organised and trained health units. The remaining six districts are too poor to run to organisations of this kind, and the district medical officers, or civil surgeons, exercise a general supervision over the sanitary and preventive activities of these districts. It is to these districts also that the Government public health organisations afford the greatest assistance.

On the public health side, there has been rapid and progressive development. Only one of the six districts in Bihar that have not so far adopted the public health organisation recommended by the Government, is thickly populated, and efforts are being made to bring it into line with the other ten districts which have well-organised public health staffs. This district has a subordinate health staff, but no health officer. The remaining five districts have large areas of forest land, with scattered, small villages. The health staffs of these districts are controlled by the district medical officers. An increase in the number of health inspectors so as to have one in every police thana is what is aimed at, but this means a considerable increase in expenditure, and will therefore take time to materialise. Every effort is made to afford opportunities to the health officers to attend special courses of instruction in subjects such as malaria, leprosy, tuberculosis, child welfare, industrial hygiene, etc., so that they may be in a position to offer expert advice on these questions when opportunity occurs, and to save the local bodies the expense of appointing specialist officers. What is wanted is greater co-operation and collaboration from the people themselves, and this is not always forthcoming. It

is largely a matter of education, and the co-operation of the people with regard to preventive measures against epidemic diseases is pretty well established. Hundreds of thousands come forward of their own free will for anti-cholera inoculations every year. Villagers will vacate their huts on the occurrence of a case of plague, or when a rat fall occurs. A case of smallpox in a village greatly facilitates the work of vaccinators, both for primary vaccination and revaccination. But co-operation is singularly lacking when measures for the improvement of the sanitation of villages are being considered.

Budgets.

The following statement shows the expenditure on medical and public health items during 1934/35 by various spending bodies in the province :

	Rs.
(1) Total expenditure by Government on public health preventive measures	3,78,038
(2) Total expenditure by Government on medical relief work	27,04,328
(3) Total expenditure by Government on sanitary engineering work	8,58,092
(4) Total expenditure by district boards on sanitation and medical relief	7,19,053
(5) Total expenditure by the municipalities on sanitation and medical relief	2,83,176
(6) Total expenditure by the local bodies, district boards and municipalities on sanitary engineering work	8,58,092
Total	58,00,779

Expenses under Voluntary and Charitable Funds.

	Rs.	a. p.
(1) Maternity and Child Welfare Association	18,422	6 0
(2) Victoria Memorial Fund	4,351	15 6
(3) Dufferin Fund	8,245	13 9
(4) Leprosy Association	8,245	13 9
(5) Provincial branch of the Indian Red Cross Society	21,296	5 9
Total	60,562	6 9

It will appear that the total expenditure on public health and medical cadre was Rs.58,61,341 6a. 9p. for a total population of 37,677,576 during the year 1934/35. This gives a total expenditure of about 2 annas 3 pies per head of the population per year.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Of the population of this province, 96% live in rural areas and are agriculturists. Only 12.6% of the male population over the age of 20 years can read and write. The standard of living is low, and sanitation is primitive. The outbreaks of epidemic diseases are not understood and are regarded, generally, as part of the natural order of life. No very rapid improvements in sanitation can therefore be made until and unless the people have been educated to appreciate the necessity for these changes. As has been stated already, some progress in this direction has been achieved with regard to preventive measures against epidemic diseases. Such measures as vaccination against smallpox have been carried out in India for generations ; but, even so, in areas where primary vaccination is compulsory there is a good deal of evasion, and unvaccinated adults and children are frequently met with in villages. An outbreak of smallpox, however, results in a rush for vaccination, which is recognised all over as a valuable protective measure.

Anti-cholera inoculation, on the other hand, has become rapidly popular, and from a few thousand inoculations done in 1926 the number done in recent years has often exceeded one million. No compulsion was ever exercised to enforce inoculation against cholera, and in many ways, in a backward province such as this, persuasion succeeds where compulsion would not only fail, but might be actively resented by the people. Some of the measures taken forcibly when plague first attacked India were strongly opposed by the people, and sometimes with violence. In spite of what has been said above, it is not suggested that persuasion will always succeed, and that when public health measures have to be taken that they should not have the support of the law. In severe epidemics, it has often been

found necessary to apply the Epidemic Diseases Act to the affected areas, more especially within municipal limits. When persuasion fails, compulsion can then be exercised.

The whole of the Public Health Department is constantly engaged in propaganda work for the education of the people. The Assistant Directors of Public Health and the health officers of districts take every opportunity of preaching the principles of sanitation and the prevention of disease when touring in rural areas. Special arrangements are made at "melas" and fairs both in rural and urban areas to deliver popular lectures in English and in the vernacular, illustrated by charts, posters and magic-lantern slides, on public health subjects. The publicity officer prepares leaflets and pamphlets for distribution at these melas and when epidemics break out, whilst the school medical officer is required to lecture on hygiene to school-children. Attendance at these lectures is obligatory. Hygiene is taught in the senior classes of vernacular and English middle schools and is a compulsory subject for the middle-school examination. Hygiene and domestic science have been included as additional or optional subjects for girls in the matriculation examination of the Patna University. In consultation with the educational authorities, the teachers in vernacular primary schools in rural areas are required to, and head men of villages are invited to, attend lectures on public health subjects given by the school medical officers during the school vacation period. The lady school medical officer similarly lectures to the girls in girls schools. It is hoped that some of this instruction permeates to the homes of the children, and that future parents will themselves be able to impart some of this knowledge to their children.

Village reconstruction and the improvement of sanitation in rural areas has occupied the attention of the Government within recent years, and a *village welfare scheme* under the Co-operative Department has already been started. Under this scheme, a centre has been selected in each of the four divisions of the Province of Bihar, in consultation with the commissioner of each division and the district officers, for welfare work in five to ten villages near each centre. The programme to be followed includes the improvement of village sanitation and public

health, the improvement of village water supplies, facilities for primary education of the adult population in night schools, agricultural improvements, the introduction of subsidiary cottage industries and the construction of village roads. Cinema shows and other entertainments are to be catered for, and an attempt is to be made to render the lot of the villager less monotonous. The fullest co-operation of all interested Government Departments such as Agriculture, Veterinary, Medical, Public Health and Education, has been obtained.

The scheme is to cover a period of five years and the staff employed at each centre consists of (1) a specially trained *welfare officer* who will explain the object of the welfare work to be undertaken and the methods to be adopted to bring about an improvement in village conditions ; (2) a *guide* or supervisor who will be responsible for the primary education of adults in night schools and will give instruction in the construction of village wells, roads, etc. ; (3) a “ *kamdar* ” or instructor in up-to-date methods of agriculture and agricultural implements, who will start a demonstration farm on land provided by the villagers and with cattle also supplied by the villagers ; (4) a *trained Dai or Indian nurse*, who will conduct the labour cases in the villages forming the centre and, it is hoped, will displace the indigenous midwife, whose insanitary methods have already been commented on in this report. The Government has recently appointed an officer of the Indian Civil Service as publicity officer of the province. The duty of this officer is to bring to the notice of the public through the medium of the Press what is being done by the various Government departments. He also arranges for lectures on popular subjects in rural areas and has been provided with a motor-van and a cinematograph to illustrate these lectures. Questions of sanitation are stressed in these lectures.

Legislation.

From time to time, various Acts dealing with public health have been passed in the province. Those that apply to urban areas are fully enforced. The Acts which apply to rural areas are being more gradually enforced, as it is realised that education of the people in the importance of these measures should precede their enforcement.

III. SANITATION AND SANITARY ENGINEERING.

There is a special branch of the Public Health Department called the Sanitary Engineering Branch in the province. The head of this department is an officer with the rank of a superintending engineer who has special knowledge and experience of sanitary engineering. Under him are three fully qualified sanitary engineers of the rank of executive engineers and a complete staff of subordinate engineers.

This department is responsible for the designing and construction of all water supplies, drainage schemes, sewage works, etc., in municipal areas, and in consultation with the Director of Public Health a series of type plans for slaughter-houses, latrines of all kinds, wells, etc., have been drawn up to assist local bodies in the construction of these structures. Although they are meant principally for towns, they have been found useful for groups of villages which have amalgamated to form village unions. Copies of some of these are attached to this report.

(1) *Housing.*

Most of the houses in rural areas are single-room huts with mud walls, mud floors and thatched roofs. A few of the roofs are tiled, and the richer landlords may have houses built of brick. The huts are usually grouped in a rough circle with an open space in the centre, and are usually located on high ground as a precaution against floods. The huts are badly designed and there is practically no ventilation. The villagers sleep outside during the hot and dry months of the year and huddle together for warmth inside their huts during the winter months. Cattle byres are provided near some of the huts, but as often as not cattle, goats, fowls and dogs share the huts with the people. Sanitation is not understood, at all events it is not practised. There are no village roads, the village lanes or pathways are not paved and become quagmires in the wet weather.

In some cases, two or more large villages have united to form a village union. A sanitation committee is formed and a small tax levied from the people, which, when supplemented by grants from the district boards, enables the union committee

to bring about some improvement in the conditions. Much is being done to try and educate the people living in rural areas in sanitation and public health, but much has yet to be done.

(2) *Water Supply.*

The water supply in rural areas is for the most part obtained from shallow surface wells. Villages situated near a river obtain their water from this source, and village tanks also afford drinking-water in areas where the subsoil water is low and wells are liable to run dry in the summer months. In these latter cases, the sources of supply are common to animals and human beings, and are used for washing, bathing and other domestic purposes. It is not uncommon to see cattle being watered, clothes being washed and people bathing in a stream a few feet above where women are engaged in collecting water for drinking purposes. The village well is for the most part a hole in the ground of varying width reaching down to the subsoil water. Water is obtained by means of a rope and bucket, and every occupier of a hut has his own rope and bucket. In larger villages where there are several castes of people, there may be separate wells for the different castes, and low-caste inhabitants are not allowed to draw water from wells used by the higher caste of villagers. It is easy to understand how water-borne diseases are spread in villages.

Much has been done to improve the type of wells in rural areas. The ideal aimed at is to have a brick-lined well with a parapet of about three feet high; the top of the parapet is sloped outwards to prevent spilt water returning to the well. There is an overhead pulley to facilitate the drawing of water, and when possible a rope and bucket is made a permanent fixture for the well. Some of the district boards carry out improvements in a certain number of village wells every year.

Since the earthquake of 1934, when a large number of the village wells in the affected areas were choked with sand and rapid arrangements had to be made for the supply of drinking-water, a large number of tube wells of the Abyssinian pattern were sunk in rural areas and proved satisfactory. The trouble with all tube wells is the pump, which soon gets out of order

and requires expert attention. After the earthquake, special mechanics were employed to look after these pumps. These wells would appear to offer a possible solution to the water-supply problem in rural areas, and with adequate instruction the people should be able to manipulate the pumps properly and be taught to carry out petty repairs.

(3) *Disposal of House Refuse and Other Waste.*

No organised conservancy service exists in villages; there are no roads and no drains. Such narrow thoroughfares as exist are never swept, and house sweepings and refuse are deposited, for the most part, at the nearest convenient spot outside the hut. There are no latrines and the fields and jungle in close proximity to the village are used for purposes of nature. Cow-dung, on account of its value as a manure, is stocked close to the huts, and, in order to prevent the pilfering of this valuable manure, every householder stocks the dung of his cattle near his hut. Cow-dung is also made into cakes and dried in the sun for fuel.

Only the more wealthy inhabitants of villages use well privies, which are known as "Sandas", of which the new bored-hole latrine is a modern improvement. Landholders encourage the villagers to use the fields, and fields nearest a village are not only the most productive, but have a higher market value compared with land situated further away.

Efforts are constantly made to induce the villages to correct these insanitary habits. They have been advised to take out a small spade with them and to excavate a shallow trench for themselves, which should be filled up after use, but it must be confessed that very little progress has been made in this direction. Recently, local bodies have been induced to construct some bored-hole latrines in rural and semi-rural areas. They have met with some success, more especially in semi-rural areas. As designed, the latrine is too expensive, especially the cost of the superstructure. It has now been suggested that all that the local body should be expected to do is to arrange for the boring of the hole and to provide the cement seat. The superstructure should be left to the villagers to construct

with any material that is readily available. Where two or more villages have united to form a union board, some progress in sanitation has been made. Many of these union boards have latrines, village roads have been improved, brick-lined wells have been sunk, and in some cases street lamps have been provided.

(4) *Campaign against Flies.*

From what has been said above it will be realised that this problem has not been seriously tackled. A campaign of this kind, to be successful, must have the full co-operation of the people, and at present the people in rural areas in this province are not prepared for it, and would not co-operate.

The rôle of the fly in the dissemination of disease is stressed in all lectures and demonstrations given by members of the Public Health Department, and leaflets and posters illustrating this point, and printed in both English and the vernacular languages, are distributed freely. But, so far, what has been achieved is both disappointing and discouraging.

It is hoped that much more will be accomplished by the welfare centres which have now been started. If villagers can see for themselves the advantages that are gained by better methods and more sanitary habits, there is reason to hope for a general and voluntary improvement in rural conditions. After all, these insanitary conditions prevailed in the smaller towns not so long ago. All these towns now have a good water supply, latrines, trenching-grounds and a proper sanitary organisation for conservancy. The people themselves are interested in the public health of their town, and are not slow to proclaim their dissatisfaction when things go wrong.

IV. NUTRITION.

This problem has not received the amount of attention and study in this province, so far, as might have been expected, and there is not a great deal of information available on the subject. The diet of the average villager is the same to-day as it was 100 years ago, and is made up for the most part of carbohydrates.

(1) *Composition of Food and Methods of its Preparation.*

The composition of the diet of the villager is a monotonous one, and varies very little throughout the year. In the greater part of the province it consists of rice, pulse and vegetables. The daily adult ration is reckoned to be about one pound to a pound and a quarter of rice, quarter of a pound of pulse, and a varying amount of vegetables. The vegetables may be cooked with mustard oil and spices to form a kind of curry, or may be merely boiled with water and spices. The pulse, or dal, is prepared by boiling with water, to which spices and salt are added until it gets to the consistency of gruel. Rice is boiled in an excess of water, the excess being poured off when the rice is cooked. This is unlike the practice in other parts of India, where the amount of water added is less and remains in the rice when it is eaten. The method of cooking rice in this province is wasteful, as the water which is strained off and thrown away has been found, in other parts of India, to contain some nourishment. This has been realised by the Jail Department of the province, and in the rice supplied to prisoners the water in which it has been boiled is not discarded but is given with the rice.

The average villager consumes little, if any, meat, and then only on very special occasion, such as a marriage feast. Very little milk is taken and very little sugar; small quantities of crude sugar, or molasses, or gur, are occasionally eaten either by itself or with boiled rice. The lower castes keep pigs, and one of those animals is occasionally killed and eaten. These animals, especially the domestic pigs, are regarded by most Indians as unclean. They act as scavengers in villages, and their habits in this respect are not such as would recommend them as a source of food supply to the better classes. Villagers living near a river, or the sea, eat fish, and certain of the aboriginal races in this province kill and eat birds and reptiles of all descriptions. The Meslom population eats beef. Some of the villagers living in districts bordering on the United Provinces where wheat is cultivated eat cakes made of flour at one of the two meals which they have every day.

- (2) *Nutritive Value of the Principal Foods peculiar to the East.*¹
- (3) *Minimum Cost of an Average Diet and Allowance for Food in Family Budgets.*

The minimum cost of adequate nutrition may be estimated to be between Rs.6 and Rs.7 per adult per month, but the cost of the average diet actually consumed is about half this sum. It is difficult to estimate the family budget per head per month. Much of what is eaten in rural areas is home produce. The required amount of rice for home consumption is set aside at the time of harvesting, and the same applies to pulses. Vegetables for the family are grown in small plots near the village, and spices and condiments are similarly grown near the village.

(4) *Diet and Health: Deficiency Diseases.*

The average Indian village diet is a pretty threadbare one, and permits of no reduction in any of the articles consumed. In Mesopotamia during the great war, for instance, when supplies of fresh vegetables in 1916 failed for a time, the Indian troops and followers suffered greatly from scurvy, and beriberi was not uncommon. There was very little scurvy amongst the British troops. Scurvy, however, is not a common disease in India except during a famine. Cases of lathyrism occur in some of the districts of the province, notably Muzaffarpur, Patna and Gaya, but detailed information is lacking. Beriberi is not uncommon amongst the rice-eating population of the province. A severe epidemic of beriberi occurred in the Manbhum district in 1935. The outbreak was confined for the most part to the town of Purulia and to the Sadr sub-division of the district. Altogether, 43,253 cases were reported with 782 deaths. The disease was most prevalent amongst the upper and middle classes.

¹ See Dr. AYKROYD'S report, page 45.

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

The Government of India is initiating a scheme for a detailed enquiry on this subject, and provincial governments have been asked to co-operate by sending an officer of the Public Health Department for special training under Dr. AYKROYD, Director of the Nutrition Research at Coonoor, in Madras. The local government has selected an officer for this training. It is hoped that this officer, when trained, will be able to collect accurate information on the dietary of this province, and that eventually steps will be taken to suggest improvements in the diets in common use. The full co-operation of the three departments mentioned above is anticipated. At present, school medical officers deliver lectures on the subject of nutrition to the senior students and teachers, and some changes have been brought about in the diets of boarding-schools through their efforts.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL AREAS.

In a very large number of the districts in Bihar there is a well-organised public health staff with a health officer in charge, and, where no health officer is employed, the district medical officer, or civil surgeon as he is called, controls the health staff. The health staff is largely concerned with the prevention of disease.

Malaria.

This disease occurs in rural areas of all districts, but in certain districts, such as Singhbhum, Purnea, Muzaffarpur, Darbhanga, Bhagalpur and Champaran, there are endemic areas where a severe type of malaria occurs. In the Singhbhum district, these areas are confined to tracts of forest, and blackwater fever is not uncommon. The Purnea district has been notoriously unhealthy in this respect for years, and portions of the Bhagalpur district through which the Kosi river flows, and which are

flooded practically every year from this river, have suffered severely within recent years.

The districts of Purnea, Muzaffarpur, Bhagalpur, Darbhanga and Champaran suffered considerably from the earthquake of 1934, which appears to have resulted in a considerable alteration in the levels of the river beds and the surrounding country. Large tracts of country for the past two years have been flooded during the rainy season, and in these areas severe epidemics of malaria occurred in 1935 and 1936. The problem here is largely one for the engineers, as the areas affected are too large for any anti-mosquito or anti-larval campaign.

In the affected area in the Darbhanga district, and in a few villages in the Darbhanga Raj, an effort is being made to treat the flooded land in close proximity to the villages with anti-larvicidal oils. This is being done at the expense of the Raj, and the experiments are being watched with interest. In this and the other areas in the other districts, a large number of special malaria dispensaries have been opened, where quinine is distributed free to the villagers. The doctors in charge of these dispensaries, most of whom are men deputed for duty by the Public Health Department, are required to visit the neighbouring villages to distribute quinine in the homes of the villagers.

Quinine is available for the treatment of malaria in all hospitals and dispensaries in rural areas, and quinine treatments are sold in all post offices throughout the province at 5 annas 3 pies per treatment of twenty tablets of four grains of quinine sulphate each.

It is generally accepted that about one-third, or less of the total mortality from "fevers" may be ascribed to malaria. The mortality from "fevers" in the province of Bihar and Orissa in 1931, 1932, 1933, 1934 and 1935 was 729,447, 564,666, 574,548, 670,389 and 663,964 respectively. During the same years, the number of cases of malaria treated in hospitals in the province was 1,057,842, 882,463, 1,016,176, 1,235,421 and 1,473,256 respectively.

No special malaria officer has been appointed in the province, but all the Assistant Directors of Public Health, and a large number of the health officers of districts, have attended the

malaria training-classes at Karnal. A few malaria surveys have been carried out both in urban and rural areas, and a survey is now in progress in the malaria-affected areas of the Muzaffarpur district.

Plague.

Plague was first introduced into the province at the end of the last century, and some of the districts were not infected until 1900. The Bihar, Tirhut and Bhagalpur divisions of the province were the ones mostly affected, and the disease never got a real hold in Chota Nagpur, whilst the districts of Orissa seem to have escaped infection altogether. For many years now the incidence and death rate from this disease have been almost negligible. A few cases occur every year in limited areas in the districts of Muzaffarpur, Saran, Darbhanga, Champaran and North Monghyr. The River Ganges would appear to form an effective barrier against its spread to districts south of it, and for many years now there has been no plague south of the Ganges.

No permanent staff is employed by the Public Health Department for plague duty, but temporary epidemic doctors are taken on and sent to affected areas when required. They carry out anti-plague inoculations and assist the staff of the local bodies in carrying out disinfection.

The value of preventive measures against this disease is well recognised by the people, who now evacuate their villages of their own accord when a case of plague occurs, or when there is a rat fall. Anti-plague inoculations are also popular and the people come forward themselves to submit to this prophylactic measure. In the years 1932, 1933, 1934 and 1935, 60,451, 25,154, 97,506 and 64,524 inoculations were performed. The Government provides plague vaccine for this purpose free of charge to local bodies.

Ankylostomiasis.

The exact incidence of this disease in the province is not known, nor have any special measures been taken for mass treatment of the people, except in prisons, where the inmates are under control. All new prisoners are examined

for ova, and those found infected receive treatment before they are allowed to mix with other prisoners.

Ankylostomiasis is prevalent throughout the province, more especially in the Chota Nagpur Division. An investigation into the prevalence of this disease amongst the employees in the coal-mines at Jharia was carried out by the chief medical officer in 1920. Out of 6,045 persons examined for ankylostoma ova, 3,189, or 53%, were found to be infected. The incidence was heavier amongst those employed underground. Thus, out of 2,436 persons employed above ground, 1,207, or 50%, were infected, whilst amongst 3,020 employed underground, 1,756, or 58%, were found to be infected. Out of 429 non-colliery workers examined, only 169, or 39%, were infected. Arrangements exist for the treatment of ankylostomiasis in all hospitals and dispensaries in the province. The disease is obviously spread by the insanitary habits of the rural population. The adoption of bore-hole latrines is being pushed, but not with any conspicuous success so far.

*Tuberculosis.*¹

In India, tuberculosis is more prevalent in urban than rural areas. The villagers in this province, under ordinary conditions, do not suffer greatly from this disease. Labourers recruited from rural areas, working in industrial centres, do contract the disease and return to die in their homes in the villages. Some infection is thus undoubtedly transmitted to other members of the family. No accurate information is available of the exact extent of the disease in rural areas. Tuberculosis is not reported separately for either medical or public health returns, and such cases in both urban and rural areas, more especially the latter, where the reporting agent is an illiterate village chawkidar, are reported under either the head "Fevers" or under respiratory diseases. Tuberculosis is now a notifiable disease in this province in towns, but it is quite evident that all cases of the disease are not notified.

A scheme for the opening of anti-tuberculosis clinics in every district headquarters town is now under consideration ; although

¹ See also Colonel MILLS's report.

located in towns, these clinics will also deal with cases from rural areas. Funds have been made available for this scheme, which, it is hoped, will materialise shortly. A few tuberculosis surveys have been carried out in some of the urban areas, but nothing of the kind has been done in rural areas. Several of the health officers have attended a special course of instruction in tuberculosis under the auspices of the King George V Thanksgiving (Anti-tuberculosis) Fund.

Pneumonia.

The extent of the prevalence of pneumonia in rural areas is not known. It is not reported separately, but along with other respiratory diseases. Hospital figures are not helpful, as they apply for the most part to towns.

Pian (Yaws).

This condition is unknown in the province.

Leprosy.

The full extent of the prevalence of this disease has not been gauged. That it occurs in every district in the province is well known, as the following figures of small surveys carried out in certain areas of a number of districts in 1930 and 1931 will show :

Name of district	Number of persons examined	Number of cases found to be infected	Incidence per 100,000
Gaya	63,104	120	143.8
Bhagalpur	172,843	153	85.3
Purnea	32,814	165	502.8
Champaran	93,683	315	336.2
Muzaffarpur	225,858	859	380.2
Hazaribagh	69,884	42	71.7
Palamau	55,906	35	62.5
Cuttack	100,923	114	227.9
Sambalpur	49,091	101	205.8
Patna City	26,921	116	152.1

The province employed a special leprosy officer for two years, when the above figures were collected. The post had to be abolished as a measure of retrenchment in 1931. There is reason to believe, however, that the post will be revived.

Six leper asylums at Gaya, Cuttack, Deoghar, Purulia, Muzaffarpur and Bhagalpur respectively, and a leper colony at Saldaha, provide accommodation for a total of 2,105 inmates. There are fifty-six leper clinics attached to dispensaries in rural areas, where lepers attend for treatment, and in 1933, 1934 and 1935 the number of cases of leprosy treated in these clinics was 9,772, 21,115 and 17,813 respectively.

Mental Diseases and Drug Addiction.

Most of the larger villages in the province have their quota of village idiots, harmless idiots for the most part, who live under the parental roof and carry out such duties as their limited intelligence will permit. They have to submit to a certain amount of chaff, more especially from the children of the village, but on the whole are well treated. How many male mentally deficient are married it is difficult to say, but it is not unusual to see an obviously mentally-deficient female nursing a child.

There are two large mental hospitals at Ranchi—one for Europeans and Anglo-Indians, which caters for mental cases from most of the provinces in India, and one for Indians, which takes in insanes from Bengal, Bihar and Orissa. The latter accommodates about 1,400 patients and is always full. These are expensive institutions to run, and it would be prohibitively expensive to provide accommodation in the Indian mental hospital for every mentally-deficient person in the province.

15. NOTES ON MEDICAL AND PUBLIC HEALTH
ORGANISATION IN THE BOMBAY PRESIDENCY.

Area : 77,221 square miles.
Population : 17,992,053.
Districts : 21.

A. MEDICAL ORGANISATION IN THE BOMBAY PRESIDENCY

by

Major-General E. W. C. BRADFIELD, C.I.E., O.B.E., K.H.S., I.M.S.,
Surgeon-General with the Government of Bombay.

HEALTH AND MEDICAL SERVICES.

Principles governing their Organisation.

The curative and preventive services in this Presidency are at present under the independent control of their respective administrative heads, the Surgeon-General with the Government of Bombay and the Director of Public Health for the Government of Bombay. It is considered that a more complete union and co-ordination of the two departments is necessary, and they should be amalgamated as a Health Ministry. Until such a Ministry is established, the fuller responsibilities of a Health Department and its interest in all that concerns the welfare of the villager will not be realised by the district officer.

As a first step towards better co-operation, the duties of a civil surgeon as a health officer have recently been defined as follows :

In addition to his duties in connection with the civil hospitals and dispensaries, the civil surgeon is the health officer of the district, and, as such, the adviser of the collector and public bodies on health matters and matters concerning the prevention and suppression of epidemics. When making any specific

recommendations concerning health matters, a copy of his report should be sent to the Director and Assistant Director of Public Health. His responsibility on health affairs will not be dissolved by the appointment of a district health officer, who will be recognised as the expert adviser for the district local board and with whom he will be required to co-operate fully.

Personnel.

Doctors.

The personnel of the Medical Department consists at present of the following officers :

	Number of officers	
I.M.S. . .	25	} Military organisations of the Government of India.
I.M.D. . .	11	
B.M.S. . .	71	} Under the control of the local Government.
S.M.S. . . .	365	

The number of doctors who have been trained at the schools and colleges of the Presidency during recent years is already having an effect on the economic position of the profession. Graduates from the university are finding it increasingly difficult to make a reasonable living and are prepared to take appointments held formerly entirely by the lower-grade sub-assistant surgeon, and the time is rapidly approaching when Bombay Presidency can seriously consider abolishing the lower-grade medical practitioner and insisting on one general minimum standard. The first step has been recently taken by the College of Physicians and Surgeons (the examining body for the lower qualifications) demanding a pass in the medical science subjects of the university for admission to the medical schools, though for the present no change has been made in the shorter and purely medical curriculum, including anatomy and physiology, for this grade. The proportion of doctors to population in some of the large cities as compared with their smaller proportion in rural areas is as follows :

(1) Ahmedabad	{	Town	1 to 1,615
		District	1 to 18,697
(2) Surat . .	{	Town	1 to 1,796
		District	1 to 8,897

(3) Nasik . .	{	Town	1 to 1,235
		District	1 to 20,000
(4) Sholapur	{	Town	1 to 2,884
		District	1 to 21,198
(5) Belgaum .	{	Town	1 to 748
		District	1 to 25,330
(6) Dharwar	{	Town	1 to 1,460
		District	1 to 17,406

There are about 6,000 private medical practitioners practising in the various places of the Presidency.

The proportion of doctors, Government and others, to population, excluding Bombay City, is 1 to 10,500 approximately.

Recently, the Government has introduced a scheme of subsidising medical practitioners who will settle in rural areas and treat the really poor in return for their small Government salary. These practitioners, however, will only settle in the Taluka towns, and it is emphasised that the real solution of the problem in this Presidency lies in road communication and the increasing use of motor transport.

Nurses.

Adequate nursing staff are employed and trained at the hospitals in Bombay and the district civil hospitals. A recent scheme will provide one midwife at each dispensary, subsidised by Government, but this will take some years to materialise fully.

There is no serious difficulty now in finding candidates for the nursing profession, except from the Mohammedan community. The Bombay Presidency Nurses, Midwives and Health Visitors' Council, which lays down the curricula and conducts the necessary examinations, is partly under Government control and is well organised. It aims at a high enough standard to attain reciprocity with the Nursing Council of Great Britain. The danger here is that it may set up too high a standard, and dais are still being trained at the majority of smaller mofussil hospitals.

Curative and Preventive Activities.

Medical officers engaged in curative work have not realised fully their responsibilities for health activities throughout their district, though this is inevitable with the present independent control of the Public Health Department. The desirability of the medical officers engaged in curative work taking an increased part in women's and children's welfare work is now being stressed.

The most important advance as regards hospital treatment is the increasing number of labour cases treated in the hospitals in Bombay.

The number of labour cases treated in hospitals and dispensaries in Bombay Presidency from 1920 to 1931 was as follows :

1920	1921	1922	1923	1924	1925
7,857	8,291	6,986	7,199	8,704	7,924
1926	1927	1928	1929	1930	1931
8,685	9,651	11,569	12,418	13,839	15,737

The popularity of the maternity hospital or home is a marked feature of medical activities in the Bombay Presidency. Practically all these institutions have been erected by private donations and many of them are self-supporting. There are many advantages of hospitalisation in a country where dwellings are crowded, insanitary and inadequate and where the supply of trained nurses cannot provide an efficient domiciliary midwife service.

The mortality rate for the City of Bombay in maternity hospitals and homes for 1935 was 0.46%, a very satisfactory figure.

The following various organisations are engaged in various health, curative and preventive activities :

	Activities	Income			Expenditure			Remarks
		Rs.	a.	p.	Rs.	a.	p.	
(1) Bombay Presidency Infant Welfare Society	Infant welfare	1,16,334	3	3	1,15,524	2	9	
		(1933)			(1933)			
(2) Bombay Presidency Baby and Health Week Association. .	Propaganda work and organisation of health section in the industrial and agricultural exhibitions	15,683	11	1	13,157	8	1	Subsidised by Government.
		(1935)			(1935)			
(3) The Blind Relief Association	Prevention and cure of blindness and the education and care of the blind							Subsidised by Government.
(4) The Red Cross Society (Bombay) (branch) .	To give assistance in all branches of nursing, health and welfare work	43,866	0	0	46,060	0	0	
		(1935)			(1935)			
(5) The British Empire Leprosy Relief Association (Bombay Branch)	Prevention and treatment of leprosy and propaganda, etc.	21,207	4	2	14,162	2	11	
		(1935)			(1935)			
(6) The Bombay Mofussil Maternity Child Welfare and Health Council	To promote co-operation and concerted action between different centres engaged in maternity, child welfare and health work in the Bombay Presidency, excluding Bombay City and suburbs							
(7) The Lady Wilson Maternity Association								Subsidised by Government.
(8) The Bombay Sanitary Association	To create an educated public opinion with regard to sanitary matters in general	6,270	14	2	6,592	13	2	Subsidised by Government.
		(1935)			(1935)			

Budgets.

The budgets for the Medical and Health Departments are presented separately, and the following is an analysis of the medical budget :

Expenditure on Bombay hospitals and dispensaries (1935/36)	Number of hospitals and dispensaries	Number of beds	Cost per bed Rs.	Cost per patient Rs.	Cost per head of population Rs.
24,00,000	414	7,097	400	0.84	0.12
Expenditure on Bombay college and schools	Number of students on rolls	Cost per student Rs. per annum			
1,80,000	1,221	(1) Grant Medical College, Bombay, 441			
		(2) B.J. Medical School, Poona, 188			
		(3) B.J. Medical School, Ahmedabad, 277			

MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

Whole-time officers known as epidemic officers are now appointed for each district in the Presidency. They are officers of the Health Department working under the control of the Civil Surgeon, and in non-malaria seasons are available for other duties in connection with rural sanitation, hygiene and health welfare.

Tuberculosis.

It is considered in this Presidency that propaganda without treatment has only a limited value and by itself has been discontinued. The money which was being spent on this work has been diverted to the establishment of tuberculosis clinics in the larger towns. Each clinic has a medical officer and a nurse trained as tuberculosis health visitor, and as funds are available the system will be extended. Limitation of funds prohibits the establishment of sanatoria on any reasonable scale, neither do finances yet permit of the appointment of whole-time tuberculosis officers.

Leprosy.

Little or no progress can be reported except the establishment of an increased number of leprosy clinics by the British Empire Leprosy Relief Association, India Council (Bombay branch). The appointment of a whole-time leprosy officer has been repeatedly stressed, but funds have not been available. Except in the districts mentioned in the original report, leprosy is not so prevalent in Bombay as in some other provinces, but the leprous beggar constitutes a bigger problem in Bombay City, for which a reasonable solution has not yet been evolved.

Mental Diseases.

There is a steady increase in the number of insanes accommodated in the various mental asylums of the Presidency from 1931, as shown below :

Year	Daily average in residence
1931	1,925
1932	2,004
1933	2,045
1934	2,108
1935	2,250

The problem of the mentally-deficient children, for whom no special school could be arranged, is still under consideration, for which at present Government finances cannot be spared.

HAFKINE INSTITUTE. ¹

The Haffkine Institute is the principal medical research laboratory of Western India, and, in addition, acts as (a) centre for the manufacture of plague vaccine for the whole of India, (b) the provincial bacteriological laboratory for routine diagnostic work and the preparation of prophylactic vaccines other than plague vaccine for the Bombay Presidency, (c) Pasteur Institute for the Bombay Presidency and the adjoining Indian States.

It is the oldest research institute in India. It was started in 1896 by the Government of India under the directorship of Dr. Waldemar Mordecae Wolf HAFKINE, when the great plague pandemic broke out

¹ Note by Lieut.-Colonel S. S. SOKHEY, M.A., M.D., I.M.S., Director, Haffkine Institute.

in India. After occupying various temporary buildings, it eventually came to rest in the present magnificent building, which, till 1885, was the official residence of the Governors of Bombay and was then abandoned, as the Government House was transferred to another site. In 1899, HAFKINE, who had been preparing prophylactic vaccine in various temporary laboratories in the city, obtained permission to take over the building for the manufacture of his vaccine. It was then known as the Plague Research Laboratory, and one of its principal functions was, as it is to-day, the manufacture of "plague prophylactic" and plague researches. The laboratory continued to expand and came to function as the principal centre for medical research and a diagnostic centre for the clinical requirements of Western India, and so, to indicate the expansion in its functions, its name was changed, in 1906, to that of the Bombay Bacteriological Laboratory. More recently, owing to a further expansion of its activities to include anti-rabic, pharmacological and biochemical research, its name was again changed, in 1925, to "The Haffkine Institute", in memory of the great investigator who was its founder and its inspiration and who may be regarded as one of India's greatest benefactors.

I. *Researches.*

(a) *Plague.*

Founded originally as a plague research laboratory, it has specialised in research into various problems connected with plague. It was here that HAFKINE originated the technique of the preparation of his plague vaccine, and later the British Plague Research Commission worked out the whole question of transmission of plague and showed by a series of masterly researches that the disease is primarily an epizootic of rats and is transmitted from them to man by the agency of rat-fleas. Researches have been continued into the epidemiology of plague to further elucidate the factors involved and the steps needed for combating epidemics of plague.

More recently, work of equally far-reaching character has been carried out resulting in the development of a biological method for the standardisation of plague vaccine. In the past, lack of such a method had led to very contradictory opinions being put forward by different workers with regard to the preparation of plague vaccine. No data were available from which it could be decided what type of vaccine was the best and what methods should be followed for its preparation. To resolve this difficulty, work was begun to develop methods for accurately measuring the virulence of plague cultures and the selection of the most suitable test laboratory animal. This work led to the development of an exact biological method for standardisation of plague vaccine, with every condition fully standardised, so that the method could be employed by any worker anywhere and would yield directly comparable results. This is the first instance of successful standardisation of bacterial

antigen and marks a great advance in plague work done in recent years.

This advance in knowledge has had immediate practical results. It has enabled the protective power of the Haffkine plague vaccine to be raised thirty-fold and more. Exact experiments show that the Haffkine vaccine is now anywhere from eight to one hundred times more potent than any other plague vaccine on the market.

This method has also enabled the Institute to shed very valuable light on the relative merits of vaccines made from heat-killed cultures and those made from live avirulent cultures. It has been shown that vaccines made from heat-killed virulent cultures are much more highly protective than vaccines made from avirulent cultures.

The new knowledge of the characters of *B. pestis* prompted fresh efforts at producing a curative serum against plague. The Institute has succeeded in producing a serum which exact laboratory experiments show to be possessed of great potency. With this serum, 70 to 80% of infected laboratory animals can be saved, while none could be saved with any serum on the market. Owing to lack of opportunities, the value of the serum has not been put to test in the field, except for a small trial, where encouraging results were obtained. Whereas the case mortality in untreated cases in this preliminary trial was 76%, the case mortality in treated cases was as low as 18%.

Further researches on serology, histo-pathology, chemo-therapy, epidemiology of plague, etc., are in progress.

(b) *Relapsing Fever.*

In 1906, the body-louse was proved to be the natural carrier of relapsing fever. This successful piece of work set the seal on the observations made twenty years previously on the clinical aspects of this disease by CARTER.

(c) *Guinea-worm Disease.*

Notable researches have been carried out on the nature, history and transmission of guinea-worm, which was proved to be carried from one man to another by the agency of cyclops, which infect wells of this Presidency. These studies have resulted in the elaboration of a highly satisfactory operation for the removal of the adult female worm from the sub-cutaneous tissues and have enabled investigations to be carried out in selected villages in the Deccan with the object of destroying the water cyclops, a minute crustacean which harbours the infective stage of the guinea-worm.

(d) *Pharmacology.*

Synthetic anti-malarials like atebrin and plasmoquine have been in use for some years, but their pharmacology has not been fully worked out. Researches in this subject are in progress. A considerable amount of work on the pharmacology of indigenous drugs has been carried out.

(e) *Nutrition.*

The biochemical department is engaged in researches in nutrition. In addition, basal metabolic rate and other normal physiological constants are being worked out for Indians.

Studies in sprue, schistosomiasis, anæmia of pregnancy and malaria have been conducted.

II. *Manufacture of Vaccines.*

(a) *Plague Vaccine.*

Since the founding of this Institute forty years ago, 41 million doses of Haffkine plague vaccine have been issued to all parts of India and the Middle East. This vaccine forms a most important prophylactic measure. The Institute is the largest producer of plague vaccine, and stocks are maintained to meet demands for almost any quantity at a moment's notice.

(b) *Other Vaccines.*

Large quantities of other prophylactic vaccines also are manufactured—*e.g.*, T.A.B., meningococcal and cholera vaccines. More than half a million doses of cholera vaccine alone have been issued during the year 1936.

III. *Anti-rabic Department.*

The Institute is the chief anti-rabic centre for the Presidency. A large number of out-patients from the City of Bombay attend daily for anti-rabic treatment. There is a marked increase in the number of out-patients attending for treatment, which shows the great popularity of this treatment. In addition to the treatment afforded at the Institute, a large number of "out-centres" have been established in different parts of the Presidency and the neighbouring Indian States. The demand for out-centres is increasing daily, resulting in a great deal of benefit to the public.

Large quantities of anti-rabic vaccine are manufactured. The vaccine adopted is carbolised fixed virus vaccine put up in different doses for treatment of five different classes of cases according to the severity and site of bite. It is stored in cold storage and issued to out-centres as required. During the five years 1931-1935, 1,983,680 c.c. of anti-rabic vaccine were manufactured and issued, and 46,597 cases treated. Statistics show very low case mortality, which may be ascribed to efficient cauterisation of wounds with nitric acid and prompt and early treatment afforded at the many out-centres now established under the decentralisation scheme for treatment for rabies.

IV. *Diagnostic Department.*

This department conducts routine bacteriological and pathological investigations for the hospitals in the Presidency, employing most recent methods and modern apparatus. More than 3,000 Wassermann tests are done yearly, in addition to cultural examinations of blood, fæces, sputum, urine, etc. The section of pathology is at present conducting research on the pathology of plague in experimental animals in addition to routine sections of pathological tissues for histological examination.

V. *Snake Venom.*

The Institute maintains a large number of poisonous snakes from which venom is collected for the manufacture of anti-venomous sera, and the process of venom extraction is counted as one of the principal attractions to the visitors. At present, the reptiles from which venom is extracted are cobras and Russell's vipers, but it is hoped that, in the near future, other varieties of poisonous snakes will also be tackled and attempts made to produce curative sera against their bite.

The Institute maintains a large library with 150 current monthly and weekly journals and a collection of recent scientific publications and books to afford suitable assistance to the workers. Facilities have been afforded to private individuals for conducting research.

B. PUBLIC HEALTH ORGANISATION IN THE BOMBAY PRESIDENCY,

by

Lieut.-Colonel A. Y. DABHOLKAR, I.M.S., Director of Public Health
for the Government of Bombay.

DISTRICT HEALTH STAFF.

A scheme for the appointment of district health officers is under consideration. In spite of the scheme of the Government to contribute a grant-in-aid equal to two-thirds of the salary of district health officers, the majority of the district local boards plead their inability to accept the scheme on account of financial stringency, and hence the Government is considering the appointment of medical officers of health for ten districts at its own expense

Ten appointments of epidemic medical officers have been sanctioned, and they are to work under the civil surgeons in their capacity as district health officers till the appointment of permanent district health officers.

RURAL SANITATION.

Under the Bombay Local Boards Act, 1923, it is the duty of district local boards to make adequate provision for (1) public vaccination, control of epidemic diseases and sanitary works and measures necessary for the public health; (2) the construction and repair of hospitals, dispensaries, markets, etc., and management and maintenance of these institutions; (3) construction and repair of public tanks, wells and water-works, etc.

The district local boards have power to make by-laws for the control of markets, dairies, creameries, slaughter-houses, burial and burning grounds, offensive trades, etc., and may impose penalties for the infringement of such by-laws. They have also power to make rules for the protection of drinking-water supplies, etc.

For the purpose of improving the sanitary condition of villages, the Bombay Village Sanitation Act was passed in 1889 for the constitution of sanitary committees and sanitary boards. These bodies have power to make rules (1) for procuring and preserving for the use of the village an adequate supply of pure potable water, (2) for cleansing the streets and open spaces, (3) for preventing accumulation of offensive and noxious matter, (4) for preventing nuisance and insanitary acts, etc.

The Bombay Village Panchayats Act was passed in 1933, and the sanitary committees constituted under the Act of 1889 are being replaced by village panchayats.

There are at present about 429 sanitary committees and village panchayats in the Presidency.

PUBLIC HEALTH LABORATORIES.

The Public Health Laboratory at Poona, established in 1913, is maintained by the Public Health Department. It deals with analytical work in connection with water supplies,

food supplies and chemical and bacteriological work. Public bodies are beginning to realise the value of this laboratory more and more as time goes on.

VACCINATION.

In 1877, vaccination was made compulsory in the City of Bombay.

It is optional for a local body to acquire powers to make vaccination compulsory in its area under the Bombay District Vaccination Act, and vaccination is compulsory now in forty-two municipal towns and ten villages in the Presidency, besides the City of Bombay.

In 1911, the control of vaccination was transferred, at the instance of the Government of India, to the local boards of one collectorate in each of the five registration districts as an experiment. The view of the department has throughout been that this experiment has not been a successful one. The Government has, however, by a resolution dated October 23rd, 1931, laid down fresh conditions under which it is ready to extend the transfer of vaccination to any local board which applies for it. This policy is based upon the fact that adequate provision for public vaccination is laid upon local bodies as an obligatory duty both under the Municipal Acts and the Local Boards Act and was prompted to some extent by the expression of a desire by some local bodies to assume control over their vaccination staffs. One district local board has accepted these conditions and taken over control of vaccination from April 1st, 1933. The question of handing over control to another district local board and a municipality is under consideration.

Glycerinated vaccine lymph is prepared and purified by the Vaccine Institute, Belgaum, and distributed to the whole of the Bombay Presidency, to Indian States and other parts of India, as well as Portuguese India, Aden, Zanzibar, Bahrein, Bushire, Bunder Abbas, Muscat, etc.

Government vaccinators are supplied with lymph regularly once a week. Hot districts like Sind, where the temperature goes as high as 120° F. or more, receive their supply in specia

cane baskets, five inches square, fitted with wet cotton wool which retains moisture for about nine days. It is compulsory for Government vaccinators to use their lymph within ten days of despatch from this institute. The results in the year 1935/36 show 99.84% case success rate and 99.15% insertion success rate.

1,729,920 doses were sent out during 1935/36.

Besides the preparation of smallpox lymph, autogenous vaccines for outside patients are also prepared by this institute.

This institute also serves as a training-centre for this Presidency, where a class is held for the instruction of vaccination and sanitation to candidates for the posts of vaccinators sent by local bodies and Assistant Directors of Public Health of this Presidency. Instructions in the preparation and preservation of lymph and in the technique of vaccination are also imparted to candidates for the posts of inspectors of sanitation and vaccination and to the officers selected for the appointments of superintendents of vaccination under the Vaccination Act. Officers from other parts of India are also sent here to study the subject of vaccination in detail.

DECLARATION OF EPIDEMIC DISEASES IN VILLAGES.

Immediately on the occurrence of a case of cholera, plague, smallpox or influenza in a village, the police patel (the village headman) sends postcards to the Mamlatdar and the Assistant Director of Public Health. He sends subsequently to the Mamlatdar daily reports until the end of the epidemic. The Mamlatdar sends a daily return of attacks and deaths by villages in his taluka to the Assistant Director, who compiles a consolidated return and sends it to the Director of Public Health.

MATERNITY AND CHILD WELFARE IN RURAL AREAS.

The Bombay Mofussil Maternity, Child Welfare and Health Council.

This Council came into existence in 1935 and the objects of the Council are : (a) to promote co-operation and concerted action between different centres engaged in maternity, child

welfare and health work in the Bombay Presidency, excluding Bombay City and suburbs ; (b) to consolidate and prevent overlapping of centres in the same area ; (c) to ensure that the work of each centre is being carried on efficiently ; (d) to establish centres wherever required ; and (e) to do all such other things as are incidental or conducive to the attainment of the above objects.

The Council has helped or started so far twenty-five mofussil centres in nine districts of this Presidency and brought about co-ordination of work between different agencies doing this work in those areas. In Poona, for instance, a district committee of the Council is formed to which eight centres are affiliated.

The Bombay Presidency Infant Welfare Society.

The bulk of maternity and infant welfare work is carried out in Bombay City. The share of the society in this work for the Presidency, excluding Bombay City, is represented by a grant of Rs. 8,000 given to the Bombay Mofussil Maternity, Child Welfare and Health Council.

The society has recently opened a Health Visitors' Institute and eight candidates are at present under training. The society has thus removed to some extent the long-felt want of having such an institution for the training of health visitors.

Other Voluntary Organisations.

The sanitary associations at Broach and Ahmedabad work in co-operation with the Red Cross Society. Their activities are mostly confined to their respective district headquarters, and to some extent they are extended to rural areas, where they send their men and materials whenever required.

BUDGETS.

The Bombay Mofussil Maternity, Child Welfare and Health Council received proportionate grants from the following institutions and trusts according to their promised contributions to the Council :

- (1) Rs. 10,000 a year from Sir Dorab Tata Trust for a period of five years ;
- (2) Rs. 3,000 a year from the N.M. Wadia Trust for a period of three years ;
- (3) Rs. 2,000 a year from the Ratan Tata Trust for a period of five years ;
- (4) Rs. 8,000 for 1936 from the Bombay Presidency Infant Welfare Society ;
- (5) Rs. 3,000 for 1936 from the Indian Red Cross Society, Bombay Provincial Branch.

	Income			Expenditure		
	Rs.	a.	p.	Rs.	a.	p.
Broach Sanitary Association	2,824	14	2	2,442	7	8
Bombay Presidency Infant Welfare Society	1,17,976	7	8	1,14,605	10	3
Ahmedabad Sanitary Association	3,961	8	0	4,259	11	9
Lady Wilson Village Maternity Association .	5,776	15	0	6,766	9	6
The Bombay Presidency Baby and Health Week Association	12,991	6	5	16,058	2	6

CONTROL OF NOXIOUS TRADES.

In rural areas, the district local boards have powers, under the Bombay Local Boards Act, to make by-laws for regulation and control of offensive callings and trades.

SCHOOL HYGIENE.

Instruction in health and sanitation is imparted in the primary schools mainly through the lessons on those subjects contained in the vernacular readers. In vernacular standard VII of boys' schools, physiology and hygiene are subjects of the course prescribed for that standard, and at the vernacular final examination half of the question paper on hygiene and elementary science is related to these subjects. In the standards for vernacular girls' schools, hygiene has been included as one of the regular subjects of instruction. In the course of studies

in primary training institutions for men, the subjects of hygiene physiology and general hygiene have been prescribed for the second-year class, while in the training institutions for women, physiology and hygiene have been prescribed for the first-year class and domestic science for the second-year class.

Propaganda work in school hygiene is done by way of lectures, demonstrations and magic-lantern slides. The visual instruction branch of the Educational Department also demonstrates occasionally in rural areas the principles of cleanliness and sanitation.

RURAL RECONSTRUCTION.

The village improvement scheme of the Bombay Government organised on the lines laid down by the late Governor, Sir Frederick Sykes, has now been in actual practice for over three years.

The essential factor of the scheme is the co-operation of all agencies—Government, local authorities, non-official associations and local effort—to improve all sides of the life of the cultivator, concentrating in the first instance on the more pressing needs of the particular village concerned. It is this co-operation and concentration of effort that is the essence of the scheme. To help the cultivator has always been the object of the Government, not only through its local administrative officers, but by creation of special departments, such as agriculture, public health and veterinary, whose particular task has been the improvement of the social and economic life of the agriculturists. The village improvement scheme co-ordinates their work and associates with it non-official effort. The scheme is based on the view that no effective progress is possible without the co-operation of the villagers themselves, and that the first task is to arouse in them an interest in, and a desire for, improvement of their condition.

Under the scheme, the primary agency is the district executive committee for village improvement, of which the collector is the *ex-officio* chairman and the president of the district local board is the vice-chairman. The committee normally includes Government officers representing the nation building departments of Government, representatives of local bodies,

such as local boards and the like, and persons concerned with social service, education, charitable organisations, etc.

Under the district executive committee, work is carried on in the talukas of the districts, either through the existing taluka development associations or by the formation of taluka committees. In villages themselves, panchayats, established under the Village Panchayats Act, or local committees are made use of. Particular subjects—as, for instance, education, co-operation, agricultural improvements, etc.—can also be dealt with by the appointment of special sub-committees.

District executive committees have been formed in all the districts of the Presidency, except the Bombay suburban district, where the work of village improvement is entrusted to the district local board. Secretaries have been appointed in most of the districts to carry on propaganda and organise activities in the districts, the necessary financial provision for them being made by Government.

It was not expected that considerable funds would be forthcoming from the villages, while the Bombay Government, engaged as it is through its several departments in matters which in themselves tend directly to the betterment of the villages and the conditions of life of village people, did not and could not contemplate large expenditure on the village uplift movement. The Government's main aim has been the inculcation of the idea of self-help, so that villages themselves can undertake certain elementary work calculated to make their villages healthier and happier places to live in, and, in the village uplift movement especially, it has developed the idea that what can be done in a corporate manner can be done in the most easy manner. The most significant common feature of what has been done is that the results obtained have been due mainly to the efforts of the people themselves. Some small village funds have been started, it is true, but most has been done through co-operative effort, while there has been a marked tendency to take all the help and advice possible from the officers of the Revenue, Agricultural, Veterinary, Co-operative, Industrial, Public Health, Medical and other departments, which have freely rendered help to the district executive committees, when and wherever possible. In this joint effort,

bodies such as the Infant Welfare Society, the Lady Wilson Village Maternity Association, etc., have also given their fullest assistance.

The aim and methods of the scheme may perhaps be most easily appreciated from the following brief statement of various activities undertaken in many villages throughout the Presidency. The number of villages in which sanitation and roads at least have been improved and the village sites cleared of rubbish, etc., already runs into several hundreds, while many have adopted a very wide diversity of uplift activities. For instance, much attention has been paid towards the all-important matter of providing an adequate and wholesome water supply. The removal of manure-pits outside the villages has been a very general measure. Gutters have been provided for village roads and streets. The work of draining unhealthy pools and pits and of constructing soak-pits has been taken up. Attempts are being made to provide public latrines, either permanent or temporary. Trench latrines with screens of brush-wood are becoming popular, and in some villages bore-hole latrines have also been constructed.

Old wells have been repaired and new ones constructed in many places, step-wells are being converted into draw-wells, while tanks also have been cleared of accumulated rubbish and silt. Efforts have been made to have the well-water treated with potassium permanganate at regular intervals. Prickly pear has practically disappeared from many villages. The destruction of this rank vegetation has been brought about by the introduction of cochineal insects. The villagers not being able to foul the land under cover of the bushes of prickly pear are now forced to adopt more sanitary methods.

Attention to health has been general. Classes in first aid have been instituted, small dispensaries founded and medicine chests distributed. The training of village dais (midwives) in scientific and hygienic midwifery methods is in progress at most civil hospitals, or is being done through private practitioners, the Red Cross, the Lady Wilson Village Maternity Association and the Bombay Mofussil Maternity, Child Welfare and Health Council.

The Government of India, being of opinion that this village uplift scheme of the Bombay Government presents a good

medium for effecting that village improvement with which it is concerned, has approved of this Government devoting the greater part of its grant to promoting the scheme, which has already been introduced, as most suitable to local needs ; and, of the funds allotted, certain sums will be devoted especially to areas where the scheme is not yet functioning effectively and where an impetus is desirable.

The following figures will show the items for which the India Government grant has been allotted and the expenditure out of the same up to June 30th, 1936 :

	Grant Rs.	Expenditure Rs.
(1) Agricultural schemes including animal husbandry	1,27,024	51,240
(2) Industrial schemes	19,636	6,757
(3) Public health and sanitation	37,065	17,155
(4) Rural water supply	26,701	13,515
(5) Village communications	20,989	12,125
(6) Education	29,618	14,299
(7) Propaganda in the districts	42,646	16,264
(8) Special agricultural and industrial schemes	94,900	9,615
(9) Miscellaneous	32,900	9,615
Unallotted reserve	1,31,392	—

Animal Husbandry.

The Bombay Government, in the year 1919, launched on the cattle improvement question by attaching to the Agricultural Department an Animal Husbandry Section with an I.A.S. officer in charge as live-stock expert. The Government has five cattle-breeding farms at which it is improving certain breeds of cattle. Pedigree bulls from these farms are put out on a premium system. The Government has also three taluka development cattle-breeding farms which it subsidises and one pinjrapole or gowshala now breeding pure-bred gir cattle which also receives a subsidy from the Government.

The Bombay Government now has 210 premium bulls working in selected areas. It is calculated that from each premium bull ten pure-bred bulls go into the country annually for further improvement.

A buffalo improvement scheme was sanctioned in the year 1935. In this scheme, four centres were selected, each area consisting of four or five villages. A herdsman was located at each centre and these were supervised by an inspector. The herdsmen tested as many buffaloes as possible in each village, by weighing milk of each animal twice daily. In this way it has been possible to locate good milkers, the progeny of which have been reared as future stud bulls. In addition to the testing of the buffaloes, the herdsmen tested the milk for fat contents. They demonstrated the use of a separator and showed the people how, by using a separator, they would get more cream, butter and ghee from their milk and yet have sweet separated milk for home consumption.

The keeping of poultry and the consumption of eggs in the villages is on the increase.

Village Improvement.

The Consulting Surveyor's Department forms part of the organisation of the Government in the promotion of village betterment, and this department has prepared an illustrated pamphlet on the principles of housing and planning as applied to villages. Its advice is sought through the collector in improving villages and also in re-siting them. The expenditure which can be afforded on improvement of a village is usually very little ; but in the villages, where improvement proposals have been put into effect, this deficiency has, to a large extent, been overcome by the help given by the villagers themselves. (Figures 1-4, between pages 228 and 229).

Co-operative Work in Rural Areas.

The co-operative principles of thrift, self-reliance and mutual aid give a definitely progressive bias to the activities of the members of co-operative societies as they become conscious of their economic interest and the means to promote them, and association into societies brings within the reach of villagers the means to prosperity. Societies enable them to achieve better business, better farming and better living. The movement has so far touched about 7.5% of the agricultural population in the Presidency. There were, on June 30th, 1936, 3,614

agricultural credit societies with a membership of 199,522 and a working capital of Rs. 2,91,31,946, including Rs. 1,30,75,612 as owned capital. Mortgage banks are a recent experiment, and the results so far are gratifying.

There are sale societies for practically all sorts of produce, the majority of them being for the sale of cotton. On June 30th, 1936, there were sixty-four sale societies. There are also ninety-five taluka development associations which supply agriculturist members with better implements and seed. There are cattle-breeding societies, seventeen in number, which raise the quality of the stock, and dairy societies, five in number, which enable the farmers to make a profitable business of their milk and butter produce. There are also twenty-four "better-living" or rural reconstruction societies which make it their business to induce the villager to banish illiteracy and wasteful habits and social customs and to improve sanitation, water supply and health of members.

SANITATION AND SANITARY ENGINEERING.

The board of Public Health Works is constituted as follows : the Commissioner, Central Division, President ; the Secretary to Government, General Department, the Secretary to Government, Public Works Department, the Director of Public Health, the Consulting Surveyor to Government, two non-officials selected from the members of the Provincial Legislature, members ; the Consulting Public Health Engineer to Government, member and Secretary.

The board is consulted by the Government regarding large individual schemes of sanitary improvements.

The duties of the Consulting Public Health Engineer are, in general, to examine technically the schemes mainly in urban areas, and to tour round the Presidency for inspecting and advising the local bodies in respect of their sanitary improvements. All public health schemes carried out from local funds are scrutinised by the Consulting Public Health Engineer for the Board in respect of their technical details and the schemes are administratively approved or recommended to Government for approval by the Board of Public Health Works before being undertaken for construction.

Fees are now charged for consultation, scrutiny of plans, inspection and supervision on the scales laid down by the Government in its memorandum dated July 4th, 1934.

Village Water Supply.

The Government places annually (on an average Rs. 80,000) at the disposal of the commissioners of divisions grants for distribution among the district local boards of the Presidency for improvement of village water supplies. These grants are supplemented by allotments from local funds and popular contributions and are expended on constructing wells, tanks, troughs and cisterns, in repairing old wells and in boring operations.

The local boards in several advanced villages put in cheap latrine blocks in accordance with the type designs approved by the Board of Public Health Works.

Conservancy.

For the disposal of night-soil, the system adopted by some of the municipalities in this Presidency is the system known as the "*Nasik System of trenching Night-soil*". It was first introduced by Major Marjoribanks (now Lieutenant-Colonel, retired), and it may be described as follows :

Ground near a nullah, wherever possible, is preferably chosen on account of good under-drainage. The pits are 5 feet wide and 2 feet to 3 feet deep and may be of any length.

The day's night-soil is first put in the pit, ash obtained from burning rubbish is then sprinkled over it and lastly a thick layer of katchra (dry refuse) is spread on the top. The ash serves as a deodorant, minimises the amount of katchra required for covering and enhances the manurial value of the poudrette. The katchra, being light, floats and efficiently seals up the night-soil. No flies are found in these pits. After about a year, the contents of the pit, dried and ripened, are very like ordinary earth in appearance and provide poudrette of high manurial value.

The Nasik system has been tried now for about thirteen years in different climates and with different soils, ranging from Sukkur to Belgaum, and not in a single place has it been known to fail if properly managed. The freedom from smell, freedom

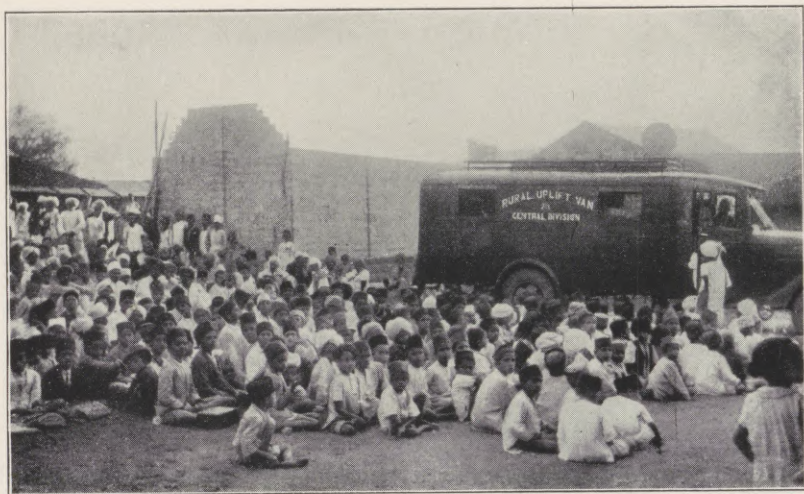


Figure 1.

Rural Uplift Van—One of the best means of carrying on propaganda in villages (Satara District). There are three such vans at present and they will be touring in all the districts of the Presidency.



Figure 2.

A Mang (depressed-class people) Colony built at Degaon—a village 3 miles from Sholapur (Bombay Presidency)—to improve their housing condition.



Figure 3.

The New Mang (depressed-class people) Colony near Poona City
(Bombay Presidency).



Figure 4.

Photograph of a model made for re-siting a village. The site is on the slope of a hill, the roads running along the contours and the houses being terraced to catch the prevailing winds and obtain the view.

from flies and production of poudrette of high manurial value are features of this system. A Nasik system depot, being innocuous, can be located fairly near the inhabited area, and this effects a saving in cartage ; besides, by preventing facilities for Bhangees to scamp work, it provides for more efficient conservancy. Another gain to be obtained is by the sale of manure. In India, 75% of the population is made up of agriculturists, and, if the use of this poudrette is popularised among them, the Nasik system would serve to benefit the cultivator and improve the finance of local bodies, besides improving public health. Nasik town derives Rs. 2,194 a year from the sale of poudrette.

MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

Cases of malaria are treated at the civil hospitals and dispensaries. Temporary medical officers are appointed annually for anti-malaria work according to the local requirements. The Government makes a provision for forty such officers for six months in the year. These officers travel in the affected districts and treat cases of malaria and other diseases.

Quinine sulphas tablets worth about Rs. 2,100 are distributed free in this Presidency every year, mainly through the agency of the officers of the Public Health Department co-ordinated by those of the Revenue, Educational and Forest Departments.

Quinine hydrochloride tablets in the form of "treatments" worth about Rs. 4,600 are sold at Rs. 3 12 annas per treatment consisting of a packet containing ten glass tubes of twenty five-grain tablets each to officers of the Engineering and Forest Departments and also at Government Treasuries. Quinine sulphas tablets are also sold at post offices at 6 pies per two tablets of five grains each, a price cheaper than the market rate. They are sold to local bodies who want to distribute them free to the public at their cost, and those local bodies having medical officers of health who purchase quinine for free distribution to the public are given twice as much quinine free by Government.

16. NOTES ON MEDICAL AND PUBLIC HEALTH
ORGANISATION IN THE CENTRAL PROVINCES
AND BERAR.

Area : 99,920 square miles.

Population : 15,507,723.

Districts : 22.

A. MEDICAL ORGANISATION IN THE CENTRAL PROVINCES
AND BERAR

by

Colonel N. M. WILSON, O.B.E., I.M.S., Inspector-General of Civil
Hospitals.

HEALTH AND MEDICAL SERVICES.

Principles governing their Organisation.

Medical relief is a transferred subject under the reforms and is in charge of the Honourable Minister for Industries. The health and medical organisations in the province are primarily two separate departments, the former, concerning the prevention of disease, being under the Director of Public Health and the latter, dealing with its cure, under the Inspector-General of Civil Hospitals.

Personnel.

(a) *Doctors.*

The civil surgeon who is in medical charge of the district and is assisted by assistant surgeons and assistant medical officers, both men and women, is, generally speaking, the Deputy Commissioner's adviser on medical matters. The civil surgeon of Nagpur, which is the capital of the province, is also the superintendent of the Robertson Medical School at that place.

The strength of medical officers working in all classes of hospitals and dispensaries in the province during the year 1935 was 464, 338 of which were licentiates.

(b) *Auxiliary Staff.*

In 1935, auxiliary staff working in hospitals and dispensaries was as follows :

(1) Nurses :	
(a) Europeans and Anglo-Indians . . .	43
(b) Indians	106
(2) Midwives	89
(3) Dais	10
(4) Compounders	434
	<hr/>
	682

A scheme has been started as an experimental measure in a few districts under which a nursing centre is established in a village where a trained nurse-midwife distributes commonly-used drugs to villagers, attends labour cases and advises expectant mothers.

Candidates are trained in medical and surgical nursing at six hospitals and in midwifery at ten hospitals in the province. We are unable to procure at present the proper type of candidate for recruitment as a probationer nurse, and the majority of those recruited will never make efficient staff nurses. Better-class educated candidates will not come forward for this profession unless they can be comfortably housed.

Curative activities are carried out by various hospitals and dispensaries, which at the end of the year 1935 numbered 339, out of which thirty-one were maintained by the State, 204 by local funds and twenty-eight by railways, the remainder being private aided and non-aided institutions. In addition, there are thirty-five Unani and 117 Ayurvedic dispensaries in the province, of which thirty-three are maintained by local bodies. Besides these, there are "Hakims" and "Vaid" who aid in this work of relief of human suffering on indigenous lines both in towns and villages, but a great majority of them are, however, untrained and may justly be classified as "quacks".

Taking into account the number of dispensaries at which the public ask for free attendance, the average area covered by a dispensary comes to 476 square miles, while the average population works out to 73,846. Thus, it has to be admitted that medical relief actually afforded by such institutions is very inadequate, and the opening of more dispensaries is a necessity for the spread of medical relief in rural areas ; but, under the present policy of the Government, local bodies are expected to take the initiative in this respect, the Government considering any application for help on its merits. The scheme for bringing medical relief within closer reach of the rural population by subsidising qualified medical practitioners to settle in rural areas, started in 1929, proved a failure.

Hospitals and dispensaries, excepting those transferred to the control of local bodies, are for the most part managed by hospital and dispensary fund committees composed of representatives of Government, local bodies and subscribers. The number of beds available at the State public, local fund and private aided hospitals at the end of the year 1935 was 2,291 (1,394 for men and 897 for women). Medical aid at these hospitals is given free to the poor ; well-to-do classes are expected to pay a small charge for medicines and for operative or other medical aid afforded.

Medical Aid for Women.

Women are treated in all general hospitals and dispensaries. In addition, there are ten separate hospitals for women, affiliated to the Dufferin Fund Association and assisted by the Government. With a few exceptions, women graduates have been attached to main hospitals situated at the headquarters of the districts. There are also mission and other private aided hospitals at some places in the province where female patients are treated exclusively by women doctors.

Medical Education.

There is one medical school in the province started at Nagpur in 1914 for training pupils for the assistant medical officers' class. The course at the school is of four years. The school

has chemical, physical, physiological and pathological laboratories and anatomical, pathological and *materia medica* museums. It has also a library containing about 2,180 volumes. Lecturers are graduates of Indian and European universities. Clinical instruction is given in the adjoining Mayo hospital, which accommodates 213 patients of all classes and has medical, surgical, eye, ear, nose, throat, dental, venereal, anti-rabic, women and children's departments. Examinations are conducted by the C.P. Medical Examination Board and diplomas are granted to successful candidates, qualifying them to practise in medicine, surgery and midwifery,

Budget.

For medical relief, funds are allotted from provincial revenues and revenues of local bodies. Based on the population of the province, which, according to the 1931 census, is 15,507,723, the figures of expenditure on medical relief for the year 1934/35 work out as follows :

	Total expenditure	Expenditure on medical relief	<i>Per capita</i> expenditure per annum on medical relief	Percentage of total expendi- ture	Approximate proportion of expenditure of each of the sources
	Rs.	Rs.	Rs.		
Provincial budget	4,55,16,000	13,57,300	0.088	3	0.7
District council .	72,27,000	3,03,000	0.019	4	0.2
Municipalities .	66,64,000	2,74,000	0.017	4	0.1

Owing to the economic distress and the apathy of the people to philanthropy, donations and subscriptions are very rare. In the year 1935, they amounted to Rs. 78,743 only.

RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Speaking generally, owing to ignorance and poverty of the masses as well as due to cross-currents of thought by and through hakims, vaides, homeopaths, chromopaths, "biopaths" (twelve tissue remedies), hydropaths and quacks, collaboration of the population is hardly to be expected.

NUTRITION.

Perhaps the following rough and general notes, as far as Central Provinces are concerned, might be of some help. I would further like to make it clear that these notes are only based on one's own general impression and not the result of any systematic research.

Composition of Food and Methods of its Preparation.

For this purpose, our province can be roughly divided into three areas as follows, depending on the staple article of food—*e.g.* :

(a) Northern districts (Hindi) : mainly a wheat-using area and part rice ;

(b) Eastern districts (Chattisgarh) : mainly a rice-eating tract ; and

(c) Southern and western area (Marahti) : mainly “Jowar” (a sort of maize) eating area with part wheat and part rice.

Green vegetables are used the most in the northern districts, in fair quantity in the eastern and rather sparingly (as hardly any are grown locally) in the third area.

“Dal” (pulse) is a fairly constant factor in the northern and south-western zones.

Fats. Ghee and/or oil (either tilli, mustard or linseed) are used by a large majority (only the quantity varying according to economic condition), excepting the very poor.

Fruits. The use of fruit, excepting occasional use of the local produce of the seasons, like oranges, mangoes, guavas and plantains, is not generally in vogue.

Milk. Is not generally used, except in the case of the infants, but *curds* (dahi) are prevalent amongst the Mahrattas. Milk, when used, is practically always boiled.

Meat, fish, etc., are not in general use amongst the Hindu population as a whole, but the non-Hindus and the lower castes take them fairly often.

Excepting the fruits, all articles of diet are boiled or fried ; salt and condiments are added where necessary when things are on the boil.

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

Nothing definite is known, but, judging by the cost of a full diet in the hospital and from individual experience, one may hazard the opinion that 3 annas is the minimum cost of a vegetarian diet *in the village*, whilst it is 5 annas in the town. As regards the allowance for food in the family budget, no statistics are available in this office, but by a rough guess one may put it down to about 30 to 40% of the income in the better class and perhaps 70 to 90% in the labouring class. This might seem paradoxical and to show that the lower classes are better off as regards dieting, but in actual reality this high percentage of expenditure in the latter class is nullified by the fact that their income is very meagre. In other words, their wages are so low that they can hardly afford two square meals a day, even by spending on them the whole of what they earn daily.

Diet and Health : Deficiency Diseases.

From what has been stated above, it will be evident that the general mass of the villagers (rural population) is underfed (and under-clothed). Their diet as a whole is poor as regards adequate nutritive value (both as regards the calories and the vitamins), with the consequence that their general health is below par and deficiency diseases like xerophthalmia, cataract, uro-lithiasis, emaciation, growth failure, impaired lactation, scurvy, dental caries, pyorrhœa, rickets and even osteomalacia are not uncommon. Unfortunately, definite statistics are not available, as no survey has been taken from this point of view in Central Provinces to my knowledge.

MENTAL DISEASES AND DRUG ADDICTION.

(a) *Measures for combating Mental Diseases.*

The only attempt at affording therapeutic relief for mental diseases is at present made through mental hospitals. This province has only one such hospital, the sanctioned strength of which is for only 470 patients, the total population

of the area (including Central Provinces States) this hospital receives patients from being 17,990,937. It will be apparent, therefore, that, with such a limited accommodation, full benefit of treatment to the total number of mentally-afflicted people cannot be afforded. The 1931 census figure of over 5,000 wandering insanes in this province alone supports this view.

No provision has yet been made in India for proper care and control of mental defectives.

Most of the existing mental hospitals are inadequately equipped and staffed. Qualified nurses, either male or female, trained in mental nursing are not available.

The following measures are suggested to improve the existing condition :

(1) Agricultural colonies, under the same management and situated not too far from the main mental hospital, where chronic or harmless patients or convalescents may be transferred. These would require a minimum of supervision, and they may well be employed in all forms of cottage industries. Such colonies will therefore be, in time, not only self-supporting, but may well reduce the cost of upkeep of the central hospital by supplying farm, garden and dairy products. Such colonies will, *pari passu*, relieve the existing over-congestion of all mental hospitals.

(2) Training-centres for nurses ;

(3) Legislative measures for mental defectives on the lines of the British Mental Deficiency Act.

(b) *Drug Addiction.*

Excepting that it still prevails amongst the labouring class, where the mothers have perforce to use such a drug as opium to stupefy their children when they are away for long hours working in the field or the factory, in spite of propaganda carried out by the sub-assistant health officers on tour in the villages and by the infant welfare centres in the towns, no definite information can be given on this subject.

B. PUBLIC HEALTH ORGANISATION IN THE CENTRAL PROVINCES

by

Major S. N. MAKAND, I.M.S., Director of Public Health.

I. HEALTH AND MEDICAL SERVICES.

Personnel.

(a) Doctors :

(1) Director of Public Health (I.M.S.)	1
(2) Civil surgeons (they also function as district health officers)	16
(3) Superintendent, C.P. Vaccine Institute and officer in charge, Public Health Institute . .	1
(4) Lady superintendent, Health School.	1
(5) Leprosy specialist	1
(6) Sub-assistant health officers (L.M.P.) (37 on epidemic duty, 17 on leprosy duty and one attached to Vaccine Institute).	55
(7) Sub-assistant health officers (in charge of epidemic dispensaries for areas inhabited by aboriginal tribes).	2
(8) Medical officers of health of municipal towns (subsidised by Government)	3

(b) Auxiliary :

(1) Sanitary Engineer	1
(2) Vaccinators	4
(3) Sanitary inspectors (subsidised by Government).	18
(4) Sanitary inspectors (not subsidised by Government).	38
(5) Assistant superintendents of vaccination	36
(6) Vaccinators	355
(7) Women health workers	78

There is no Assistant Director of Public Health, Junior Assistant Director of Public Health, malaria officer or assistant.

There is a provincial Public Health Board consisting of the Director of Public Health (as Chairman), Chief Engineer, Public Works Department, local self-government secretary, Commissioner of Division concerned and two nominated members, to whom all major schemes in connection with drainage, waterworks, town extension, etc., are referred for opinion.

An Improvement Trust for Nagpur was established during 1936.

Preventive Activities.

The Director of Public Health and civil surgeons periodically inspect municipal towns, notified and sanitation committee areas, gram-panchayats, fair areas and villages in order to study the local sanitary situation and sanitary problems and advise the authorities concerned. At their inspection, special attention is paid to water supply, conservancy (public and private sanitary conveniences), system of collection, removal and disposal of night-soil and latrine sullage, collection, removal and disposal of refuse and dead bodies, conservancy staff, drainage, slaughter of animals, sale of meat, matters affecting food supply (markets, dairies, bakeries, aerated-water factories, eating-houses and adulteration of food), prevalence of infectious and other diseases, arrangements for dealing with epidemics, isolation hospitals, registration of vital statistics, vaccination, infant and maternal welfare, breeding-places of mosquitoes, etc. Reports on the inspections made are sent to the local bodies concerned through commissioners and deputy commissioners and a copy of the Director of Public Health's notes are supplied to civil surgeons. Reports of action taken on these inspections are required to be submitted through the deputy commissioners and commissioners.

During epidemics, the Director of Public Health and civil surgeons visit affected towns and villages.

Particular stress is laid on school inspections, which deal with the physical condition of scholars and their vaccination state, school buildings, sanitary conveniences and water supply. Monthly and annual inspections of schools and school-children are carried out by assistant surgeons and assistant medical officers. In the case of Government and aided schools, records

of each scholar are maintained. A monthly report is submitted to the Director of Public Health. Special action is taken to obtain vaccination, anti-cholera and anti-plague inoculation of all school-children. Cases of enlargement of spleen, skin diseases, optical defects, leprosy, etc., are individually dealt with. So far, action in connection with oral hygiene has not been possible.

The sub-assistant health officers in charge of epidemic dispensaries tour in the rural areas for twenty-one days every month. During prevalence of epidemics, they are on tour throughout the month. Their normal duty is to examine and advise on water supply, conservancy, drainage, village schools, breeding-places of mosquitoes, rat mortality, chief diseases, etc. They also carry out propaganda by lectures, charts and lantern demonstrations on a wide range of sanitary subjects. The use of quinine in the treatment of malaria is encouraged.

During epidemics, they carry out suitable propaganda, inoculations, disinfection of wells, disinfection of houses and infectious materials, as well as treatment of patients, evacuation of plague-infected bustees, etc.

A weekly report of the work done is submitted to the Director of Public Health through the civil surgeon and deputy commissioner. Remarks of these officers are recorded on these reports for necessary action.

Standing orders to sub-assistant health officers to supply information on the following points have been issued and are complied with :

- (1) Detailed description of water supply in villages.
- (2) Report on facilities for obtaining quinine. In each case the distance of the nearest place where quinine is available is mentioned.
- (3) Vital statistics for current quarters and for the corresponding one of previous year and notes on special causes of death.
- (4) Report on dates of last vaccination and inspection by assistant superintendent of vaccination and of the number of children available for vaccination.
- (5) Report on any unusual mortality.
- (6) Results of investigations on causes of death.

Sub-assistant health officers are also deputed for duty at fairs, for the conduct of which special arrangements are made by civil surgeons and deputy commissioners in consultation with the Director of Public Health.

The sub-assistant health officers have also to carry out treatment of ordinary and extraordinary causes of disease. A monthly statement containing details of the number of villages visited, the number of patients treated for various diseases, the number of wells disinfected, number of inoculations performed, etc., is submitted to the Director of Public Health.

There is a *Public Health and Vaccine Institute* where vaccine lymph is prepared for the whole of the province and for a number of feudatory States, where vaccinators and assistant superintendents of vaccination are trained and where chemical and bacteriological examinations are carried out.

The *Health School* was established in 1929 and is concerned in the training of health visitors. The number of health visitors trained up to date is eighty-two. The superintendent is also the Honorary Secretary of the Provincial Welfare Committee of the Red Cross Committee. One of her duties as a Government official is to inspect and report on infant welfare centres in the province.

Budgets.

The local Government makes an annual allotment of Rs. 3,64,000 for expenditure in the Public Health Department. A sum of Rs. 7,800 is annually available from the British Empire Leprosy Relief Association for anti-leprosy work in selected areas. A sum of Rs. 48,688 is donated by the provincial branch of the Indian Red Cross for welfare work. A sum of Rs. 40,000 has been donated from the Silver Jubilee Fund for the establishment of anti-tubercular clinics. A sum of Rs. 27,000 raised by public subscription has been presented to Pendra Sanatorium.

Municipal committees are required to submit to the Director of Public Health a copy of their budget estimates to enable him to ascertain what provisions have been made for conservancy and sanitary works.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

This is being looked after by the Provincial Village Uplift Board, on which the Director of Public Health is represented. Village uplift work is in progress in six villages of Saugor district, under the supervision of an epidemic sub-assistant health officer. The work was spread over the whole of Piparia revenue inspector's circle (Hoshangabad district) under an epidemic sub-assistant health officer and is well supported by district officers, and in twenty-four villages of Nimar district. The work is done under the guidance of the Revenue Authorities.

The lines of work are : (a) sanitary survey ; (b) drainage ; (c) anti-malarial measures ; (d) conservancy and proper disposal of night-soil and refuse ; (e) protection, repairs and disinfection of wells ; (f) maternal and infant welfare ; (g) treatment by travelling dispensary ; (h) propaganda, etc.

The vast majority of villages are still untouched by modern sanitary ideas of living. There is a great deal of ignorance. The better classes show some response, but the lower and depressed classes have shown very little change or desire to improve their methods of living. This is particularly noticeable in connection with water supply and conservancy. Very often our efforts to help them to overcome such infections as cholera and other infectious bowel diseases have failed because of lack of co-operation by the people. Very dubious sources of water supply are resorted to, even where good wells are provided. In certain districts, water from nullahs and tanks is used in preference to well water. There is, however, one welcome improvement, and it is that in most places our attempts to help are not resented. The readiness with which cholera inoculations are accepted is quite different from the opposition which was met with a few years ago. The chief difficulty in the way of obtaining general rather than isolated individual collaboration is the division of villages and small country towns into sections of different classes who live in a sort of watertight compartment and have very little interest in each other. They are apparently indifferent to what happens to other sections as long as their particular class or section is

well served and is safe. This lack of common interests and aims and objects, which tend to work for the betterment of the community as a whole, is a great drawback, with the result that improvement in one direction is neutralised by retrogression or deterioration in another.

Owing to financial stringency, the local Government stopped grants towards the improvement of rural water supply; but, during 1936, with the generous assistance of the Government of India, it has been possible to restart this very necessary help to district councils.

Owing to the jungle nature of the country, scattered and diffuse situation of villages, difficulties of communication in certain tracts and paucity of medical and sanitary staff, large sections of rural areas are inadequately served with preventive and curative attention. The existing travelling dispensaries will have to be at least doubled to provide one dispensary for each tehsil. This has been advocated, but, owing to lack of funds, the proposal cannot be given effect to.

Two special travelling dispensaries for aboriginal tribes were created during 1936 and are working satisfactorily. Proposals to open three more such dispensaries in selected areas have been submitted.

In the Berar, the headman of the village—viz., the “Patel”—has been given a sort of semi-official position and serves the purpose of representing village interests. If he is sympathetic and enlightened, he is usually of great help in getting things done. In the Central Provinces, the factors of Malguzars (large landowners), called “Mukaddams”, perform the same duties as “Patels” in the Berar. The co-operation of these village officials is very necessary, as they carry weight with the villagers. Many instances have been reported where Mukaddams have been lukewarm or altogether antagonistic towards measures proposed for the welfare of the village. Such instances are brought to the notice of the deputy commissioner in order to remove or mitigate such hindrances.

III. SANITATION AND SANITARY ENGINEERING.

There is no separate sanitary engineer in the province. The work is looked after by the Chief Engineer, Public Works

Department. The preliminary investigation and estimates for major projects are worked out by the sanitary engineer free of cost on application by local bodies. If the local body considers the scheme favourably and furnishes a guarantee that the work will be taken up, a detailed estimate is made out at Government expense.

A separate section of sanitary engineer technical experts, who would give their entire time and energies to the study of sanitary problems and their rectifications, is necessary.

Housing.

In towns, only the fairly well-to-do have pucca-built houses, whereas the major portion of the population resides in huts and hovels constructed of mud, bamboo matting, grass and scrub. The majority of small towns are nothing but glorified villages with barely 10% of pucca-built houses. No plan or order is usually practised in the building of houses, and this fact aggravates the already exceedingly unsatisfactory situation with regard to drainage.

The workers in mills, mines and factories are badly housed, but gradually the authorities are being persuaded to provide better quarters for their labour. A model town in Nagpur (for Empress Mills workers) has been built, and the manganese mines in Balaghat and Ramtek have also provided pucca quarters for some of their workers.

Owing to poverty, there has also been marked deterioration in the structure of houses in many towns and villages, particularly in the Berar. Owing to economic distress in certain localities, smaller towns have been deserted by trading and labouring sections of the population and their houses are left neglected, unrepaired and are becoming ruinous.

Rural Water Supply.

The supply varies in different districts. In Chhattisgarh Division, the supply is mainly from tanks. A few private wells exist, but are only used by the better class.

The agricultural section of the population offers very serious difficulties with regard to water supply. During the height

of agricultural operations, which, in the case of rice, cotton and juar, occur during the rains, the villages and the outskirts of towns (where labourers usually dwell) are deserted during the day, as men, women and children are all out working in the fields. Irrigation is entirely dependent on rainfall and not partly on wells, as obtains in the United Provinces and the Punjab. The result is that the only water available for drinking is either from ricefields or from nullahs, streams, ditches and ponds. On the occurrence of cholera, these become infected and a serious outbreak of the disease occurs. In many towns, cholera usually begins in—and is often confined to—the agricultural population. In this manner the fact of a good water supply from wells in villages is frequently vitiated. In the Berar, particularly in the Amraoti and Akola districts, wells are inclined to be brackish and rivers and streams are resorted to for water supply. This is one of the causes of serious outbreaks of cholera in these districts.

The Mahars and other depressed classes, which form a large section of the population of most villages and small towns all over the province, are not allowed to draw water from public wells. There are only a few places where separate wells have been provided for them, but, generally speaking, their sources of supply are nullah, stream and pond, which are usually grossly polluted by bathing, washing and discharge of sullage into them. Where the source of supply of the general population is from streams and rivers, they are allotted the lowest, and therefore the filthiest, part of the stream for their use.

Disposal of House Refuse and Other Wastes.

House and town refuse is usually collected outside towns and villages and is annually auctioned or utilised for fertilising fields.

Great difficulty is experienced with regard to refuse from stable and cattle-sheds. The litter and dung is usually collected in the yards of the houses pending its removal to the fields. These materials are of great economic value to the villagers. Their removal from the premises often means its loss. Any elaborate or difficult method of storing these

collections is not possible. At present we are endeavouring to encourage tight packing of the collections and encasing of the mounds so formed by a two- to three-inch thick layer of clay.

Campaign against Flies.

This is being chiefly carried out by ordering a better system of collection, removal and disposal of excrementitious matters and refuse from houses, cattle-sheds, etc. The night-soil trenches and the sludge in kuccha sullage drainage channels have been found to be the two most fruitful sources of flies. The latter have often been found actually pulsating with fly maggots.

The major part of the population uses open places within the towns and villages or in its immediate surroundings for defecation. Children seldom use a latrine—public or private.

A proper system of conservancy is the most urgent requirement in most towns and villages.

The heavy clayey and “moorum” soil usually met with are great drawbacks in the proper trenching of night-soil.

Owing to the most primitive methods of conservancy practised, or their entire absence, our efforts in the first instance are to obtain some elementary changes on which we can establish further advances. It is the primary essentials on which all sanitation is based which we so miserably lack at present. I feel everything will follow once we have created in the minds of the people a sense of repugnance and abhorrence for all that is filthy so that they will not tolerate it in their midst. When this sense is developed, means will be easily forthcoming to satisfy an urgent demand of the individual and the community.

IV. NUTRITION.

Composition of Food and Methods of its Preparation.

The staple diet of the people in Chhattisgarh Division, Chanda and Chhindwara districts is rice. In the Berars it is *juar*. In other districts it is wheat and rice combined. Wheat predominates in the diet of the northern districts, such as Saugor, Hoshangabad, Nimar and Jubbulpore, where climatic

and geological conditions approximate those of the United Provinces.

A large variety of “dhals” are cultivated in the province, the chief being “tuar” or “arhar”, which is largely consumed.

Gram is popular in most parts and is largely taken in the form of “bhajias” (a sort of spiced savoury made with gram flour), dal, “sev” (macaroni- or vermicelli-shaped gram flour paste fried in “ghee” or oils) and “karhi” (a sort of curry made with curd and gram flour). The other dals, such as moong, masoor and urda, are also used on a small scale.

“Kodan” and kutki flour is chiefly used by the aborigines and is grown in districts where they mostly reside—*e.g.*, Jubbulpore, Mandla, Betul, Chhindwara, Balaghat and Drug districts.

The nutritive value of this article has not been investigated. Kodan grains are boiled like rice and kutki is ground into flour, with which cakes are made. They are the staple articles of diet of the Gonds. In Chhattisgarh Division, the practice of eating “basi” (stale) boiled rice is common. Rice is cooked in bulk and kept for future meals after addition of cold water.

A variety of “chickpea”, known as “lakh” (tiura), is cultivated chiefly in the Chhattisgarh and Jubbulpore divisions and is largely used as “dal” by the poorer classes. It has been reported to produce symptoms of lathyrism.

The fats employed in cooking are chiefly of vegetable origin. “Til” oil is greatly preferred; after that comes linseed oil.

Ground-nut and “jagni” oils are often used to adulterate these. The consumption of “ghee” is much less than in the Punjab and United Provinces. Mustard oil is hardly used for cooking, except in the northern districts.

Milk is available everywhere and varies in price between 4 to 8 seers to the rupee. It is consumed by the upper and middle classes in the form of milk, “rubri” (condensed by prolonged cooking), curd and “karhi”. The poorer classes, even those who keep milch cattle, use very little, as most of it is sold. In spite of its cheapness in rural areas, milk is not available to the very poor because of want of ready cash.

The province is very rich in such fruits as oranges, guavas, bananas, papayees, waternuts, custard-apples and “bers”

(plums). Oranges are available from the middle of October to the middle of May and are sold from 6 annas to Rs. 2 per 100, according to quality.

Guavas are in season from November to March and are abundant and cheap. They can be obtained at four or five fruits per 3 pies.

The other fruits are also abundant and cheap.

Mangoes are also largely cultivated and are fairly cheap.

Melons and watermelons are largely grown in Hoshangabad, Bhandara, Raipur, Bilaspur and Jubbulpore districts.

Fruits on the whole are cheap and in abundance and obtainable all the year round.

A large variety of vegetables are grown all over the province and are cheap.

Eggs, meat, fish (both fresh and dried) and poultry are available at all markets at comparatively cheap rates. The majority of Hindus in the province are vegetarians.

Nutritive Value of the Principal Foods peculiar to the East.

The nutritive value of the cereals and pulses mentioned, with the exceptions of kondu, kutki and "lakh", is mentioned in standard text-books and is therefore not given in this note.

Diet and Health : Deficiency Diseases.

Beriberi and scurvy are rare. A number of deaths from beriberi are usually found in death registers, but it is found that such entries are made through ignorance and at random.

Rickets and osteomalacia are fairly common amongst the poor, but accurate figures are not available.

Among the poor and lower middle classes a low state of bodily resistance due to faulty diets is noted. Sufficient consumption of milk and milk fats and absence of any kind of animal protein, especially eggs, and a fairly restricted carbohydrate diet in rice-eating districts is accountable for this. Although nourishing foods of all varieties are abundantly available at most places, the lack of money has led to deterioration and decrease in both the quality and quantity of food ingested.

V. MEASURES FOR COMBATING CERTAIN DISEASES
IN RURAL DISTRICTS.

Malaria.

Malaria is endemic in certain parts of this province and is responsible for 50% of the total mortality. Three travelling dispensaries have been established, one at Dharni, in Amraoti district, one for Mahadwani tract, in Mandla district, and the third one at Manipur, in Raipur district. All these are in poor tracts where mortality from malaria is high. The Government also makes a free issue of quinine. Quinine is made easily available by the appointment of quinine vendors in a number of places in rural areas. Besides this, sub-assistant health officers advise the rural public for the following preventive measures: prevention of collection of water in or about the houses or in or about the towns; use of mosquito-nets; oiling with kerosene; protection of larvæ-eating fish in tanks, and use of quinine in 5-grain tablets or 10 grains twice a week on two successive days during malarial season, September to January.

Quinine is also obtainable free at Government hospitals and dispensaries and from sub-assistant health officers. It is also supplied for free distribution by the Director of Public Health on recommendation of the civil surgeon and the deputy commissioner.

A provincial fish hatchery is under contemplation.

Plague.

Directly a report of mortality amongst rats is reported, people are advised to get themselves inoculated.

The following measures are generally advised for rural areas: rat destruction, inoculation, evacuation, chemical and solar disinfection and disinsectisation.

Regulations for general application have been framed by the Government for municipal towns, for inspection of persons travelling by railway and for the segregation of persons suspected of being infected with plague.

Ankylostomiasis.

Efforts are being made to treat cases in mines and jails with thymol or oil of chinopodium, by wearing shoes and by the use of sanitary privies.

Extension and improvement of a proper conservancy system is being encouraged and demanded both in rural and urban areas.

Tuberculosis.

The disease appears to be on the increase in this province. There is one sanatorium at Pendra Road, in Bilaspur district, managed by missionaries. Convicts suffering from tuberculosis are treated in jail at Chhindwara. The Government has recently sanctioned the establishment of four tubercular clinics at Nagpur, Jubbulpore, Raipur and Amraoti, and has sanctioned money for the extension and proper staffing of Pendra Sanatorium. The sub-assistant health officers advise people by an informal talk with them to take measures to check the disease.

Pneumonia.

It is regretted that precise information on this point cannot be furnished, as until now pneumonia has not been registered separately, but has been entered in the general column of respiratory diseases. A separate column for pneumonia has been introduced in the amended vital statistics registration form brought into use in 1936.

At all the hospitals and dispensaries in this province, the number of pneumonia cases treated indoors and outdoors during 1935 were 6,256. Of these, 405 died. No special action has been taken to study the situation with regard to this disease and to devise and suggest preventive measures. The incidence of this disease and mortality therefrom, as can be ascertained, is not serious.

During 1936, 264 cases with three deaths were reported in the daily epidemic returns.

The climatic conditions generally prevailing in the greater part of the province are not favourable to the causation of pneumonia, nor is the infection of a virulent type.

Pian (Yaws).

This disease is very rare in the province and is only found in the thick forest tracts in the Chanda district, adjoining Hyderabad State. A travelling dispensary has been proposed and arrangements have been made to treat cases in Chanda and Sironcha hospitals.

Leprosy.

A regular leprosy campaign is carried out in the Chhattisgarh Division (where incidence of leprosy is comparatively high) by seventeen sub-assistant health officers under the guidance of a leprosy specialist at Raipur. The work consists of propaganda, survey and treatment and the cost is entirely met from the provincial revenues. Thirty-one treatment centres and thirty-five sub-centres have been established. Up to date, 8,589 lepers have been registered, and between 25 to 30% of these attend weekly for treatment. Besides this, there are three leprosy sub-assistant health officers in Amraoti district and one in Khandwa district. The cost is met out of the fund allotted by the provincial branch of the British Empire Leprosy Relief Association. There are six leper asylums, with accommodation for nearly 2,000 lepers, in British territory (Champa Mungeli, Raipur, Dhamtari, Chandkhuri and Kothara) and one feudatory State (Rajnaodgaon State). All are managed by missions to lepers. The Government gives a capitation grant for maintenance of lepers to these asylums and also grants for special objects, such as building, wells and other sanitary works. The Leper Act has been extended to the whole Central Provinces and Berar and leper asylums. Chandkhuri and Kothara (Amraoti district) have been appointed as leper asylums for the respective areas to receive Government lepers.

Mental Diseases and Drug Addiction.

(See Colonel WILSON's note, page 235)

17. NOTE ON THE HEALTH ORGANISATION IN THE RURAL AREA OF DELHI PROVINCE

by

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Delhi Province.

Area : 593 square miles.

Population : 636,246.

I. HEALTH SERVICES.

The Province of Delhi is an independent administrative area under the charge of a Chief Commissioner, who is assisted by a Deputy Commissioner and by a District Board, a partly elected and partly nominated body which controls the income and expenditure of funds in the rural areas.

There are about 360 villages in the whole province, the population of the rural areas amounting to 199,771 inhabitants.

The health services in the rural area have hitherto been based on the police system of administration (*i.e.*, on the thanas), because in each thana there is a civil dispensary (staffed and administered by the chief medical officer of the province), the sub-assistant surgeon in charge of which is employed on a part-time basis for health work. He is virtually the local representative of the Assistant Director of Public Health in that particular thana. It is hoped that, in the near future, he will be replaced by an official who will be engaged solely in public health work and who will have more time to meet and co-operate with the local members of the district board and the welfare committees appointed in each village.

The head of the health services organisation in the province is the Public Health Commissioner with the Government of India, who is *ex-officio* Director of Public Health of the province. Under this officer there is the Assistant Director of Public Health, who has as his chief assistant in the rural areas a senior sanitary inspector, known as the superintendent of health operations, with headquarters at New Delhi, who spends, at the moment, at least three days a week in travelling about

in the rural areas. This official also has certain duties in the urban area, of which it is hoped to relieve him at an early date so that he may be able to concentrate his activities on his rural work.

The auxiliary staff consists of sanitary assistants, who have received a rudimentary training in sanitary work, and a few sanitary guides, who are nothing more than foremen of work with some practical knowledge of sanitary work based on experience in the field. The duties of these men consist largely in supervising the work of a number of mates and coolies (forty-three) working in gangs usually consisting of one mate and four coolies, who tour the villages in regular routine to deal with sanitary matters in each village, who scavenge, trap rats and, wherever possible, get the assistance of the villagers in carrying out sanitary works. In the reorganisation scheme envisaged for the province, it is hoped to employ permanently a larger staff of sweepers or coolies, who will carry out the scavenging work required. The existing arrangement whereby caste or customary sweepers in villages carry out the work of scavenging in consideration of payment in kind (grain) by the villagers is not a satisfactory one.

During the malaria season, additional personnel are employed for anti-malaria work, usually about twenty-four additional coolies.

There are also a number of trained vaccinators and two dispensers who are temporarily engaged on sanitary work. It is proposed to have at least one whole-time vaccinator in the new reorganisation.

Three maternity and child welfare centres in three of the larger thanas are staffed by nurse dais (or literate Indian midwives), who not only carry out the welfare duties attached to a centre, but also train the traditional and hereditary Indian village dais (or midwives) in midwifery and child welfare.

Preventive Activities.

The activities directed towards the preservation of health and the prevention of disease include the routine trapping of rats to prevent plague ; the vaccination of the people ; the

proper disposal of refuse to prevent fly-breeding ; improvement in the disposal of house sullage ; improvement in the construction of village wells and water supply ; the prevention of malaria by the filling-in of depressions, and the draining and oiling of pools where necessary ; health propaganda by means of wireless sets in selected villages or by means of a set installed on a travelling dispensary (Figure 5, opposite page 254), or by the teaching staff in schools ; illustrated magic-lantern lectures by the sanitary inspector, or by a specially appointed publicity officer ; the improvement in the dietary of the people ; instruction in personal and domestic hygiene, including ventilation ; and health lectures illustrated by magic-lantern slides delivered by a specially appointed publicity officer.

Budgets.

The existing budgetary provision on account of personnel amounts to Rs. 53,661. This includes the pay and allowances of the Assistant Director of Public Health and the superintendent of health operations.

The district board report shows that the total income from all sources in the rural area was Rs. 2,55,602 in 1935, from which had to be deducted a sum of Rs. 1,25,000 granted by the Government for the specific purpose of education. From the available balance of income, the district board has set aside in its estimates a maximum of 25% to be spent on combined medical services and public health services. The actual amount spent during 1935/36 was Rs. 37,158, which exceeded the estimate made, this representing 28% of the available income, and included Rs. 13,290 on account of public health, Rs. 7,156 on sanitation and Rs. 3,316 on maternity and child welfare, besides Rs. 23,868 spent on the dispensaries.

No charitable or voluntary funds are placed at the disposal of the district board, but a private organisation called the Delhi Health Week, which is subscribed to by residents of the province, assists materially by establishing, staffing and maintaining welfare centres in the province, and organising exhibitions on matters of hygiene and public health.

The Rockefeller Foundation is to establish a health unit in one of the rural areas, the cost being shared between the Government and the Foundation for the first five years, when the Government assumes full responsibility.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

There is no special officer in charge of the rural reconstruction in the Delhi Province. This work is undertaken jointly by the various authorities concerned in rural welfare. There is thus the district board, which is the official body, on which the Assistant Director of Public Health serves as a member. There is also the Delhi Health Week, which enterprising and entirely private body has done a great deal in stimulating the development of sanitary consciousness in the province, besides the material assistance above referred to. There is, of course, the office of the Assistant Director of Public Health, with the staff already described in detail, and another board known as the Central Village Welfare Board, which has as its object the co-ordination of assistance and the stimulation of the various activities, official and non-official, in the rural areas of the province. The intention is to eliminate redundancy or waste of effort and to pool all available resources in a joint effort against poverty, malnutrition and ignorance in the countryside.

III. SANITATION AND SANITARY ENGINEERING.

Housing.

Housing conditions in the rural areas are in the most part deplorable. Cattle, chickens and villagers live together indiscriminately in hopeless confusion. In the better-class houses, the cooking is done in one corner of the small courtyard and the smoke nuisance is thus avoided. In the less pretentious houses, the cooking is done in the living-room, and to the congested air is added the smoke from the "chulas". There are no separate living-rooms or bedrooms. The villagers sleep where they eat and they eat where they sleep. A small hole

in the wall at the bottom of the courtyard serves the purpose of draining sullage water away from the house ; but, as no drainage exists outside, this filthy water merely forms a dirty pool in the street or lane on which the house abuts. The houses are in most cases made entirely of mud, with no windows whatsoever. A spirited drive has recently been made to induce the people to make holes in the wall and to fit into these a concrete window-framework so that the living-rooms may be ventilated. It is regretted that, during the colder months, these are of doubtful value, as the villagers invariably block them up. Means, however, are being devised to circumvent this habit.

It is hoped shortly to put before the district board a scheme for the building of a model village on sanitary lines. The underlying idea is that the village will be built with Government assistance and that the people, who in this case happen to be the inhabitants of a village ruined by inundation, will be afforded an opportunity of acquiring their houses on a modified " hire-purchase " system.

Water Supply.

Shallow wells constitute the main sources of water in the rural areas. Fair progress has been made during the last few years in protecting these wells from contamination, but the degree of protection afforded has not been of a very high order. Recently, a new pattern with high parapet surrounding the lip of the well has been adopted as the standard (Figure 6), and it is hoped that the villagers will be persuaded to adopt the habit of drawing water with a receptacle provided at the well. In this manner, the danger incurred by the whole community from the existing practice of drawing water by means of vessels brought from each individual house will be avoided. Where there has been any suspicion of gross contamination, wells have been chlorinated or otherwise treated with chemicals to purify the water ; but the most effective step yet taken has been the adoption of the suggestion that a number of tube wells be installed in the villages. The objection to tube wells is that they frequently get out of order and there

is no one in the villages to carry out the necessary repairs. It is felt, however, that, in the larger villages at least, there would always be someone with sufficient intelligence and knowledge to put the pump in order. The scheme is only on an experimental basis at present, and if it is a success it is hoped to employ the services of an inspector who will go round the villages regularly, see that the pumps are in good working order and effect necessary repairs where required.

Disposal of House Refuse and Other Wastes.

A certain amount of progress has been made in inducing villagers to carry their refuse from their houses to properly prepared pits, where it is packed tightly in such a manner as to discourage the breeding of flies and where it can mature effectively for use as manure. Many still find it easier to dump their house refuse in the streets and lanes outside their houses.

The countryside remains without question the most favourite place for defecation. Even where latrines have been provided, preference has been shown for the open country. Efforts will continue to be made to popularise latrines, but it will probably be long before they can ever achieve great popularity.

The disposal of house sullage in the villages presents a problem of no mean order. House-to-house collection is not feasible because of the lack of the necessary conveyance ; closed drains cannot be considered in many cases because of lack of funds, and open drains are in many cases impossible because of the lack of an adequate fall. Individual soakage pits provide one solution to the problem, and if these are well enough constructed and carefully maintained they should cause no offence and no trouble, excepting possibly during the rains. A system of small surface concrete drains, where the levels permit, discharging on a prepared drying area will probably be effective in certain cases and will be tried in future.

Campaign against Flies.

The measures already indicated for the disposal of house refuse, including cattle droppings, is in itself a step towards the prevention of fly-breeding. The scavenging done by the

sanitary squads is another measure in the same direction. The danger to the community of infection through the medium of flies from infected faeces lying indiscriminately on the land surrounding each village cannot be exaggerated and the people have been repeatedly warned. The subject of flies is a favourite one amongst the lectures delivered on health matters.

IV. NUTRITION.

It cannot be claimed that sufficient data have yet been collected for any far-reaching conclusions to be arrived at on the subject of nutrition ; but information is being steadily compiled, and a recent survey held in the province has furnished useful hints which are being followed up.

The composition of the average meal of the villagers consists of atta (wholemeal flour) and rice as the staple articles, with milk and milk products, vegetables, dal and meat in varying quantities according to circumstances, tastes and religious practices. Of the diets examined in the survey referred to, it was found that atta, butter-milk and leafy vegetables occurred in every diet. But this does not mean that these have appeared in adequate quantities or that the diet is properly balanced. Assuming that 2,900 calories, 95 grammes of protein, 435 grammes of carbohydrates and 86 grammes of fat were the minimum requirements per day, it was found that 50% of the diets were deficient in the calories, 30% in proteins, 30% in carbohydrates and no less than 100% in fats, while most were lacking in two or more important elements. Although the percentage of diets with an adequate quantity of proteins was found to be high, shortage in "first-class" proteins was observed in no less than 90% of the diets examined. The importance of this shortage lies in the fact that, in the absence of first-class proteins, the less suitable proteins derived from cereals which constitute the bulk of the diets cannot be effectively utilised. The most abundant sources of first-class proteins, fish, meat, eggs and liver, seldom or ever enter the villagers' diet. On the other hand, milk, cheese, curds, butter-milk and green leafy vegetables, which afford as good a source as the others, cannot be said to be as difficult for them to obtain.

As far as milk and milk products are concerned, the difficulty lies in the fact that the milk available has got to be sold in order to add to the meagre income of the villager, and that in most cases all that is left to the family to drink is butter-milk after butter or ghee has been made for sale. There appears to be no adequate excuse for the lack of a sufficiency of green vegetables, and if each man could be persuaded to grow enough for himself and his family the problem of the lack of first-class proteins will be very nearly solved. Dal, the proteins in which are of better value than those in atta, was found to be deficient in 50% of the dietaries. Here, again, the difficulty is an economical one.

It is difficult to assess the cost of an adequate diet, as the prices vary from place to place. On an average, however, it has been estimated that an adequate dietary per man value per week cannot cost less than Rs. 1 12 annas to Rs. 2, and even this is a very low figure. No figures are available as yet to ascertain the proportion of money devoted to food from the total family income.

Diet and Health.

Here, again, the records available are too incomplete to enable one to express an opinion. Cases of rickets have been seen, and a few cases of osteomalacia and dental caries; but there is at least reason to believe that there is no high prevalence of deficiency diseases among the rural population.

Co-ordination of Health, Educational and Agricultural Services.

No definite plans of co-ordination have actually been evolved as yet, but in actual practice the office of the Assistant Director of Public Health is in close touch with the agricultural authorities and has recently pointed out the need of the cultivation of soya beans as a means of providing an important element lacking in most dietaries. Similarly, the Civil Administration has been informed of the manner in which the villager has to deprive himself and his family of the milk, or the best part of the milk, produced by his cows in order to provide the where-withal for his family to subsist at all. In time, as more facts

are collected and more is known of the value of the Indian diets and of their deficiencies than at present, detailed plans will, it is hoped, be worked out so that the three authorities concerned will work together as a team.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

During the rainy season, a special staff of coolies and mates is employed for anti-malarial work—*i.e.*, to drain water, fill in depressions, oil collections of water, and generally to prevent the breeding of mosquitoes. It is hoped that, under the new reorganisation, a special anti-malaria officer will be appointed on a permanent basis, with whatever staff will be found to be required as a result of a preliminary survey to be conducted shortly. At present, spleen index surveys are carried out by the sub-assistant surgeons in charge of dispensaries, and those villages showing a high spleen index are specially dealt with. Every effort is being made by illustrated lectures, by personal contact, by health plays and by exhibitions to show the villagers the significance of the mosquito and how it propagates malaria. Villagers have been repeatedly told that, if they deal effectively with the larvæ, they will free themselves and their family of the curse of fever which undermines their vitality. So far, however, it, seems that the villagers have not overcome their prejudices. Cheap mosquito-nets are available at Rs. 2 or Rs. 3 and villagers have been shown the advantage of using them. So far, however, it cannot be claimed that any have been reported in use in the villages. The Public Health Department issues, free of charge, quinine to all villages with a particularly high incidence of malaria. This issue is not made as a regular routine, nor has any attempt been made to issue it as a prophylactic.

Plague.

In this case it may be claimed that substantial progress has been made by means of the regular rat-trapping operations.

Not a single case of plague has occurred in the rural areas of the province since 1929, and the number of rats exterminated averages about 360,000 per annum.

Ankylostomiasis.

No cases of ankylostomiasis have been reported in the province.

Tuberculosis.

The data available are again meagre and no valuable opinion can be expressed on the incidence of this disease in the rural area. The steps taken to improve the sanitation generally in the homes and in the villages, and to improve the standard of nutrition, of life and of education are all equally directed towards the prevention of tuberculosis. No provision exists specially for the treatment of cases if found to be suffering from tuberculosis, but arrangements could probably be made for admission to a sanatorium in Delhi.

Pneumonia.

The prevalence of this disease, as far as is known, does not justify any special steps being taken for its prevention.

Yaws.

No cases have been reported in the province.

Leprosy.

Very few cases are reported, and these amongst vagrants coming here from the neighbouring provinces. There is no reason to suppose that the disease is widely prevalent in this province.

Mental Diseases and Drug Addiction.

No cases have been recorded.

18. NOTES ON MEDICAL AND PUBLIC HEALTH ORGANISATIONS IN THE MADRAS PRESIDENCY.

Area : 141,705 square miles.
Population : 44,183,690.
Districts : 25.

A. MEDICAL SERVICES IN THE MADRAS PRESIDENCY

by

Major-General Sir F. P. CONNOR, Kt., D.S.O., K.H.S., I.M.S.,
Surgeon-General with the Government of Madras.

HEALTH AND MEDICAL SERVICES.

In the mofussil, the headquarters hospital of each district is maintained by the Government. In accordance with the policy of the Government for the improvement of the facilities for medical relief in rural areas and at the same time relieve local bodies of considerable financial liabilities, the Government has assumed the management of 117 local fund and municipal medical institutions for development as divisional centres for medicine and surgery. In addition to the above, there are also hospitals and dispensaries established and maintained by the Government in the agency tracts and remote parts where medical aid cannot be had easily, and for special departments such as police, forest, agriculture, etc. Under the provision of the Local Boards and District Municipalities Acts, local bodies provide and maintain, either from endowments or from local and municipal funds, hospitals and dispensaries where the sick poor within the jurisdiction of each local board or municipality are entitled to receive medical and surgical advice and treatment free of charge.

So far as Government medical institutions are concerned, all persons are given medicines free of charge and, also, no charges are made for medical advice and treatment. Persons who are in receipt of an income of Rs. 50 and above are charged for

treatment as in-patients in general wards of Government hospitals. More or less similar arrangements exist in the hospitals and dispensaries run by local boards and municipal councils.

With a view to bringing medical relief within easy reach of the rural population and to solve the problem of unemployment to a material extent, the Government sanctioned, in 1925, the scheme by subsidising medical practitioners to settle in rural villages and to treat patients resorting to the dispensaries free.¹ According to this scheme, the Government pays a subsidy of Rs. 500 or Rs. 600 to the medical practitioner according to whether he is an L.M.P. or a medical graduate, and the local body concerned meets the cost of medicines, drugs and instruments. The Government also pays an additional subsidy of Rs. 300 per annum if a qualified midwife is employed for affording maternity relief to the female population. The subsidised medical practitioner is bound to give free treatment to the necessitous poor on an average of thirty out-patients daily. The Government has also permitted the employment by district boards of the licentiates of the Government Indian Medical School, Madras, in rural dispensaries. District boards have also opened additional rural dispensaries, and their entire cost, including the subsidies of medical practitioners and midwives, is met entirely by the respective district boards. On the suggestion of the Director of Public Health and agreed to by the Surgeon-General, medical practitioners of rural dispensaries are directed to do public health work, such as verification of vaccination and births and deaths, the control of epidemic diseases, the promotion of soil sanitation, etc., on payment of a small remuneration of Rs. 15 per mensem, and such work is carried out under the guidance of district health officers. The scheme is, for the present, being given a trial in the case of two rural dispensaries in each district. The subsidised rural medical relief scheme, which has been gradually given effect to from 1925, has worked satisfactorily on the whole. There are about 428 such rural dispensaries,

¹ See also Lieut.-Colonel GANAPATHI's note as regards the public health work of rural practitioners attached to dispensaries.

including the rural dispensaries maintained wholly by the district boards.

There are also medical institutions maintained by private subscriptions and missions, some receiving grants from Government or local funds, and also from railways.

At the beginning of the year 1936, there were 1,363 medical institutions of all classes at work in the Presidency—*i.e.*, 1,116 in rural areas and 247 in urban areas—191 State public, 28 State special, 510 local and municipal funds, 66 private aided, 91 private non-aided, 49 railways and 428 subsidised rural dispensaries. The daily average in-patients attendance during 1935 was 11,244.20. The total number of outdoor patients treated in 1935 was 16,570,958.

The Government provides and maintains three mental hospitals in the Presidency—at Madras, Calicut and Waltair. European and criminal insanes are admitted and treated only in the Madras Mental Hospital. The total accommodation available in the three hospitals is as follows :

Name of mental hospital	Sanctioned accommodation	Average daily population in 1935
Madras	744	1,285
Waltair	124	162
Calicut	286	372

The total population of the three mental hospitals during the year 1935 was 2,449 (1,871 males and 578 females).

Tuberculosis.

Patients suffering from tuberculosis are admitted and treated in all hospitals and dispensaries. There are special institutions intended solely for the treatment of tuberculosis patients in the following places :

The Government Tuberculosis Institute, Madras, for out-patients and the Tuberculosis Hospital, Madras, for in-patients. The Tuberculosis Hospital contains eighty beds (fifty-two for males and twenty-eight for females), and the number of tuberculosis patients treated for tuberculosis in all medical institutions during 1935 was 77,412, with 1,413 deaths. The

Superintendent of the Tuberculosis Hospital, Madras, reports that, on an average, the period of stay of the cases that improved by treatment was sixty-one days. An attempt has been made by the Director for the Government Tuberculosis Institute to serve as a centre for after-treatment of cases discharged from other hospitals and sanatoria in the Presidency and outside. A tuberculosis clinic for the examination of contacts by the tuberculosis sub-committee of the King George V Thanksgiving (Anti-Tuberculosis) Fund, Indian Red Cross Society, has been started on up-to-date lines as an adjunct to the Government Tuberculosis Institute, Madras, and as a further step in anti-tuberculosis work in Madras City, and has been working for the last year successfully.

In addition to the Government Tuberculosis Hospital and Institute, there are some institutions run mainly for tuberculosis disease by mission authorities. For instance, the Union Mission Tuberculosis Sanatorium, Madanapalle, Chittoor district, is maintained by missions with large capitation and building grants from this Government. There is also another mission sanatorium for tuberculosis at Vishantipuram, Ranajmundry, and, in view of the fact that the disease is spreading and to provide more accommodation and special treatment for such cases, the Government is taking over Dr. MUTHU's tuberculosis sanatorium at Ihambaram, in Chingleput district. The Coimbatore District Tuberculosis Sanatorium Society has proposed to establish and maintain a sanatorium at Perundurai for patients actually or suspected to be suffering from tuberculosis and for those who are convalescents, and the foundation-stone for the sanatorium at Perundurai was laid by the Acting Governor on July 1st, 1936.

Leprosy.

The group leprosy scheme began in 1931 and the policy of the scheme was to train medical officers in leprosy to do propaganda work and educate the public and to stimulate the local bodies to finance and maintain leprosy clinics. This work was intensively carried on by the leprosy officers, as the result of which 446 clinics are now functioning. Clinics have been

opened in all the districts; all the Government medical institutions and most of the local fund medical institutions have leprosy clinics. Much publicity has been given to leprosy work, the fears and ignorance of the medical officers and the lay public are gradually passing off, the possibilities of the treatment are understood and the local bodies are realising the importance of the work, all of which are attributable to useful work done by the leprosy officers, though it was of a diffuse nature.

Venereal Diseases.

During the seven years from 1929 to 1935, fifty-five male doctors and sixteen female doctors had undergone training in the diagnosis and treatment of venereal diseases. Venereal clinics have also been opened in almost all the district headquarters hospitals in the Presidency.

Anti-rabic Treatment.

The Pasteur Institute of Southern India was opened at Coonoor in April 1907, and it continued to be the only anti-rabic organisation until 1922, when, with the sanction of the Government of Madras, it was resolved to issue carbolised anti-rabic vaccine to different centres in the Presidency, so that persons bitten by animals suspected to be rabid might be treated locally and saved long railways journeys to Coonoor with all the attendant expenses. The scheme was begun as a tentative one and vaccine was issued only to the superintendents of Government headquarters hospitals. The scheme was put into operation gradually during the year 1922. During the years 1923 to 1927, seventy new anti-rabic treatment centres were opened in the Madras Presidency and in the adjoining Indian States.

Treatment at the Institute is still open to anyone who desires it and can go to Coonoor at his own expense. The Institute remains the centre for treatment for the Nilgiris district.

The Pasteur Institute, Coonoor, was the first institute in this country to start the broadcasting of the anti-rabic vaccine treatment, and at present there are 192 centres in the Madras Presidency and in the Indian States. So far, 156 medical

officers have been given a week's training at this institute in the technique of anti-rabic treatment to enable them to take charge of anti-rabic treatment centres.

A large number of persons bitten by rabid animals are seeking treatment nowadays owing to the increased facilities provided by the multiplication of treatment centres and owing also to the propaganda carried out by the Public Health Department of the Government of Madras in collaboration with the Pasteur Institute of Southern India.

B. PUBLIC HEALTH ADMINISTRATION IN MADRAS PRESIDENCY

by

Lieut.-Colonel C. M. GANAPATHY, M.C., I.M.S., Director of Public
Health, Madras.

ADMINISTRATION.

The Director of Public Health is the head of the Public Health Department.

The *Public Health Committee* is composed of the following Officers : Surgeon-General, Chairman ; Director of Public Health, Secretary ; Director, King Institute, Guindy ; Director of Town Planning, Madras ; Sanitary Engineer to Government, Madras ; Secretary, Education and Public Health Department, Madras.

The committee meets once a quarter ; it examines all questions submitted by the various heads of departments relating to public health and forwards its recommendations to the Government.

The strength of the Public Health Department on December 31st, 1935, was :

(1) Director of Public Health	1
(2) Assistant Directors of Public Health	4

This includes the post of Professor of Hygiene

(3) Assistant Directress of Public Health	1
(4) First-class health officers	58
This includes the posts of the health officer and two assistant health officers of the Madras Corporation not included in the provincial public health cadre.	
(5) Second-class health officers	55
(6) Health inspectors	314
This includes the post of one health inspector for famine duty, one for anti-malarial work at Madakasira and 27 for the construction of bore-hole latrines sanctioned during the year.	
(7) Government vaccinators	42
(8) First-class vaccinators (employed by local bodies)	251
(9) Second-class vaccinators (employed by local bodies)	613
(10) Probationary vaccinators (employed by local bodies)	25
(11) Entomological assistant	1
(12) Compounders	2

A. *Central Organisation: Personnel at Headquarters and their Duties.*

Under the Director of Public Health there are five Assistant Directors of Public Health, one rural sanitation and propaganda officer, one malaria officer and one research health officer. With the exception of the research health officer, all are stationed centrally at Madras.

The research health officer is in charge of field investigations into the epidemiology of plague.

B. *District Public Health Organisation (Rural).*

The size of a district varies from 3,000 to 8,000 square miles and the population from 1 to 3½ millions. Each district is subdivided into taluks, the number depending on the size of

the district. Each taluk is roughly about 500 square miles, with about 100 to 300 villages and an average (mainly rural) population of 200,000.

The district health officer (a first-class health officer) is in charge of each revenue district. He is a provincial servant, but his office is attached to the district board under whom he is working. In some of the larger districts, the district health officer has one assistant health officer to help him, and in other districts, where maternity relief and child welfare work have been organised, the district health officer has an assistant woman medical officer also for this branch of work.

A health inspector is in charge of one taluk. Under him, two or three vaccinators are employed by the district board, the exact number of vaccinators depending on the size of the taluk. The health inspector's pay and travelling allowance and any other expenditure connected with his office, are met out of provincial funds.

The health inspectors check the work of vaccinators, verify the results of the cases vaccinated by them and themselves perform re-vaccinations and vaccinations in some of the villages visited by them. They are responsible for supervising festival arrangements in their areas, for taking prompt preventive measures against epidemic diseases, for conducting propaganda during their routine visits to villages, for improving the registration of vital statistics, and for bringing to the notice of the local bodies through the district health officer any sanitary defects noticed by them, with suggestions for their rectification. The health inspectors have received training in inoculation work also, and this has been found very useful during epidemics of cholera and plague.

There are two classes of vaccinators—first class and second class, the former being qualified sanitary inspectors. The vaccinators are employed for routine vaccination work, including re-vaccination in the villages under their charge, and are responsible for improving the registration of vital statistics and taking prompt remedial measures on the outbreak of smallpox. They are also utilised, whenever this is found necessary, for the supervision of sanitary arrangements at festivals and for epidemic duties.

Scheme of Rural Medical Practitioners working in the Public Health Department.

In 1934, the Government, as an experimental measure, sanctioned a scheme for the utilisation in each district of the services of two rural medical practitioners attached to rural dispensaries for the furtherance of public health work. They are given a consolidated remuneration of Rs. 15 each per mensem. These men are placed directly under the district health officers and are permitted to discharge all the duties ordinarily carried out by health inspectors. The scheme was sanctioned in the first instance for two years. This period was mostly spent in getting the district boards to take the scheme in hand, to select suitable centres and to train and equip the rural medical practitioners in public health work. The Government was accordingly requested to continue the scheme for a further period of two years, and to this it agreed.

Maternity and Child Welfare.

Maternity and child welfare work is one of the recent activities of the Public Health Department, where a special section for the subject was created in 1931 and a medical woman was appointed as Assistant Directress of Public Health, Maternity and Child Welfare. A survey of all the conditions with a bearing on maternity and child welfare was almost immediately undertaken with a view to organising the work on a correct basis and co-ordinating the efforts of medical and public health authorities and also of voluntary agencies, of which there were a few in the field. The organisation and conduct of maternity and child welfare work have not been easy, for the following reasons :

(i) Until it was taken up as a departmental activity in 1931, maternity and child welfare was largely in the hands of voluntary authorities. These were of all types. Some were keen and enthusiastic, others were indifferent and irresponsible for lack of suitable membership. Even in the case of the former, their most useful members were officials who were seldom long enough in one place to stabilise the work, and these members

were not always succeeded by others equally ardent. All the voluntary organisations were ignorant as to the real aim and scope of maternity and child welfare. Ante-natal and intra-natal work was not understood in its true relation to maternity and child welfare as a whole ; consequently, a good deal of energy and money was wasted. The activities consisted largely of bathing and feeding a few children of the depressed classes, with a midwife as the only worker in charge. The midwife also looked after labour cases when her other duties permitted. Health officers in the areas were either advisers or had no definite duties whatever ; they had no authority either to improve or to end what was amiss.

(ii) The public was largely indifferent to the movement, and there was little response, particularly from mothers. Thus, local bodies, whenever requested by the department to make provision for maternity and child welfare, replied that they were prevented from doing so by financial stringency.

The work was new to most health officers and there were few women medical officers, health visitors, or midwives. Conditions of service were most unsatisfactory and pioneers ready to face the inevitable hardships were not easily found.

These difficulties have been successfully overcome as a result of experience gained in a few districts chosen by the Government for intensive work during the year 1934. Maternity and child welfare has now been given its rightful place as an activity of the Public Health Department. The Red Cross Society, which is the largest voluntary organisation carrying on maternity and child welfare work, has revised its programme and also agreed actively to co-operate in departmental policy, thus ending the dual control which had previously existed.

Health officers have needed much guidance, but they have now begun to understand their responsibilities in the matter of maternity and child welfare work and are able to advance towards the definite goal of stabilising effective maternity and child welfare schemes under the local authorities they serve. Some of these local bodies have taken over, with a new sense of responsibility, schemes handled ineffectively in the past by voluntary associations.

Local bodies quickly responded. This is shown by the total allocations made by them. The amounts are as follows :

	1931/32 Rs.	1935/36 Rs.
District boards	35,227	1,11,912
Municipalities	90,454	1,17,730

Improvement in the Type of Staff Available.

Women workers, being assured of more satisfactory service conditions in increasingly stable schemes, are now more ready to accept work. The department has at present a list of applicants for posts. The employment of health visitors under local bodies has been given careful attention and conditions of service and salaries have been improved in every way possible. Training centres for midwives have increased. A large number of midwives is thus available for approved schemes. The Director of Public Health had been appointed a member of the Nurses and Midwives Council. Another important feature of maternity and child welfare work is the maintenance of suitable records and registers, and their standardisation.

The frequent visits and tours of inspection undertaken by the Assistant Directress of Public Health, Maternity and Child Welfare, have led to a correct understanding of the scope and aim of maternity and child welfare work, and the first-hand knowledge thus obtained regarding conditions in urban and remote rural areas was of great value to the Director of Public Health in moulding policy during the early years when he was developing a new section of the department. Experience shows that maternity and child welfare work cannot be considered apart from other activities of the Health Department ; its relation to other aspects of health work has to be constantly studied.

A post-graduate course has been instituted for women medical officers engaged in maternity and child welfare work under local bodies. The taking of this course has been rendered compulsory by the Government if officers are to be retained in the service of the local bodies. Ten women medical officers completed the course in 1936 and ten others are expected to

do so in 1937. It is hoped to extend and amplify the course as opportunity offers.

At present, thirty-one women medical officers, twenty-four health visitors and 303 midwives are employed in child welfare centres opened under schemes of work undertaken by local bodies and approved by the Director of Public Health. The centres have quickly become popular ; women in villages now readily call in the midwife, consult the woman medical officer about themselves and their children, and accept ante-natal and infant care and the supervision and teaching of health visitors. They attend the mothers' classes and lantern lectures and listen to gramophone records on health matters. Girls' schools in villages are also visited regularly, and the health talks are much appreciated by the girls. The topics chosen at the mothers' classes and the schools relate to the healthy management of the village home and to the village family's needs in the matter of environment, clothing and food ; a steady effort is also being made to indicate to the mother her place in the home and in the rural community as the originator of healthy standards of living. The work at the centres has also a definite social value, for in some of them mothers play indoor village games and spend a pleasant time together.

These centres have benefited 35,453 mothers. Of these, 20,053 received ante-natal supervision and 14,385 were attended during labour. The children born under the care of the scheme were, as far as possible, brought under the supervision of the staff during infancy and the pre-school period. In spite of the inadequacy of the staff of health visitors, 9,480 infants and 6,228 pre-school children received periodical supervision ; 16,213 home visits were made by the women medical officers, 9,480 by the health visitors and 187,338 by the midwives ; 1,133 mothers' classes were held and 304 girls' school visited for health talks ; 246 lantern lectures were given.

The centres in Kistna district are each provided with a maternity bed. These *maternity rooms* are very popular ; 201 labour cases out of 722 were dealt with in these rooms. In places where the buildings used for the maternity and child welfare centres are sufficiently commodious and convenient, they have become social centres for the women and children.

When proposals were submitted for the construction of centres, every opportunity was taken to improve the designs of the buildings so as to include at least sufficient accommodation for : (i) ante-natal and infant clinics, (ii) mothers' classes, (iii) maternity room with a bed, (iv) sterilising room, (v) kitchen, store-room, bath-room and sanitary conveniences, and (vi) a play centre. It is hoped that, in course of time, the old type of building which provided only scanty accommodation will be replaced by new buildings of the above type. The grants from the Silver Jubilee Fund have given a great impetus to the construction of such buildings.

A children's hospital was opened at Madras during the year. It is hoped that the necessity for such institutions will be increasingly realised and that before long each district will have a children's hospital of its own.

School Hygiene.

(1) A scheme for the medical inspection of schools was first introduced in 1925 and was made applicable to recognised secondary boys' schools. In 1926, medical inspection was made obligatory in all recognised secondary schools and colleges for boys. In 1928, it was extended to arts colleges for men and women and to elementary schools for boys in areas where education is compulsory. The inspection was carried out by registered medical practitioners. One-third of the fees payable to them was recovered from the pupils, one-third was paid by the school authorities, and the remaining third came from a Government grant. In April 1932, the grant was withdrawn, since the system of inspection was not producing results of sufficient practical value to justify its continuance during the then existing financial stringency. An organised scheme for the medical inspection of schools, providing for the periodical examination of pupils and the treatment of observed defects, is under consideration by the Government.

(2) The health officers of the Government are required to examine all Government and board schools as part of their ordinary duties and issue a sanitary certificate for purposes

of recognition. Recognition takes place only on the production of the above certificate by the school management authorities.

During their tours, the health officers and health inspectors have to visit the schools and report on the sanitary condition to the educational authorities concerned.

Health Education.

Health education of the masses forms an important part of the activities of the public health staff in the district. To be effective, this education of the masses has to be carried on from day to day and from week to week throughout the year. The district health officer, through his health inspectors and vaccinators, organises propaganda work in the villages on all matters relating to public health. During a specially selected week known as the “National Health and Baby Week”, intensive propaganda work is carried out by the public health staff. In the course of that week, public attention is focused on problems of health in relation of the well-being of the community. These intensive campaigns have had a great effect, particularly on school-children; they have created a strong public opinion and have thus been of considerable help when it has proved necessary to enforce public health measures. In this work, the presidents of local bodies, the chairmen and executive authorities of municipal councils and the officers of the various other Government Departments—Revenue, Labour, Medical, Education and Police—have been rendering valuable help, and several private medical practitioners co-operate with the public health staff in carrying out this intensive propaganda.

Advantage is taken of large gatherings of pilgrims at fairs and festivals to organise and conduct intensive propaganda work by means of exhibitions, cinema shows, lantern lectures, etc.

In the office of the Director of Public Health is kept a large stock of leaflets, posters, magic-lanterns, slides, portable cinema equipments and films. The posters and leaflets are sold to local bodies as required, and the lanterns and cinema equipments are lent on hire at nominal rates fixed by the Government.

Weekly bulletins of public health conditions in the Presidency are regularly published in all the local daily newspapers for the information of the public. The prevalence of an epidemic in any area where important festivals are to be held is given prominence in these weekly bulletins so as to warn intending pilgrims.

Budget.

The Government review of the latest administration reports on the working of local boards and municipalities in the Presidency for the year 1933/34 shows that a sum of Rs. 67.00 lakhs has been spent on public health in municipalities (urban areas), Rs. 13.70 lakhs in rural areas,¹ and Rs. 23.16 lakhs by the provincial Government.² The total expenditure on public health by the municipalities, the local boards and the Government for the year 1933/34 is Rs. 103.96 lakhs.

RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

It has long been recognised that organised programmes of rural development are essential for the advancement of the physical, social, economic and educational progress of the rural population. The various Development Departments of Government—Public Health, Medical, Education, Industries,

¹ (a) Preventive medicine, ordinary :

	Lakhs of rupees
(1) Health staff	1.71
(2) Epidemic and endemic diseases . . .	4.95
(3) Sanitation	1.62
(4) Births and deaths	0.27
(5) Water supply and drainage	1.76
(6) Other items	0.06
Total ordinary	10.37

(b) Capital account :

Preventive medicine, including water supply and drainage	3.33
Total	13.70

² The total figure amounts to Rs. 23,16,263, including Rs. 8,00,477 for public health in the Mofussil area, Rs. 37,094 for the Rural Sanitation Campaign, Rs. 47,565 in connection with plague control and Rs. 34,950 for malaria (purchase of quinine for free distribution).

Agricultural, Co-operative, etc.—have attempted from time to time to improve the condition of the villagers in their own way ; but these efforts have mostly been spasmodic and have often slackened with a change of personnel. Though officials and others have not been lacking in enthusiasm in the past and have endeavoured to make the rural population happy and contented, their efforts were unco-ordinated and the results achieved were consequently unimportant. An attempt was made in 1933 to secure better co-ordination of the work of the various departments in a selected area in Chingleput district under the auspices of the Public Health Department, but this scheme was discontinued in the latter half of 1934.

The Government, however, had under consideration the question of creating an organisation for the purpose of co-ordinating the work of several departments and for regulating and promoting what are called the nation-building activities with a view to improving the social and economic life of the villagers. The Government constituted in July 1936 a *District Economic Council for Rural Reconstruction* work in each district. These councils can also make recommendations to the Provincial Economic Council.

Public health is only one of the activities of the district economic councils. An intensive scheme for the improvement of rural health was started as an experiment in October 1935 in a group of villages in Sriperumbudur taluk, Chingleput district, with Poonamallee as its headquarters. A *health unit* is in charge of the work ; it consists of a first-class health officer, one woman medical officer, four health inspectors, four health visitors and eight midwives. The sphere of work of the health unit extends over an area exceeding 25 square miles, with a population of 42,000 in twenty-five villages. The area is divided into four convenient circles, each having a population of about ten thousand. Each circle has a health centre and a staff of one health inspector, one health visitor and two midwives.

The health unit is responsible for all aspects of public health in the area, including vaccination and protective inoculations, vital statistics, health education, domestic and personal hygiene, sanitation (including water supply), drainage and provision of latrines, control of epidemic and endemic diseases, hookworm

control, school medical inspection, ante-natal, natal and post-natal care of expectant mothers, welfare of infants and pre-school children, etc. Funds for sanitary works are provided by the district board or the panchayats concerned. The underlying principle is to inculcate the idea of self-help amongst the villagers and to create in them a desire for better and healthier living. Local health committees have been formed in the villages for this purpose and for tackling local health problems under the guidance of the health unit. The co-operation of the villagers in this respect and in all preventive efforts has been very encouraging.

The Poonamallee health unit is the first of its kind in the Presidency, and it affords a very good training-ground in rural health work for health officers, sanitary inspectors, medical students, health visitors and others interested in public health problems.

There is an advisory committee for the unit with the Revenue Divisional Officer, Saidapet, as the Chairman, the health officer as the secretary, and the presidents of panchayats, the local representative of the Rockefeller Foundation, and a representative from each of the non-panchayat villages, as members.

The scheme is financed partly from the Government of India Grant for rural development and partly from contributions by the Rockefeller Foundation of America.

SANITATION.

Rural Water Supply.

To encourage the introduction of protected water supplies in rural areas, the Government is distributing grants year after year and the district boards are requested to make an equal contribution from their funds. During the last two years, the Government of India has made a substantial contribution to the local Government towards rural development, and the local Government has earmarked a large portion of this amount for rural water supplies and placed the amount at the disposal of the collector to be spent in consultation with the district economic council and the Public Health Department.

In the case of rural water supplies, the district boards have been asked to draw up a programme in consultation with the district health officers. A priority list of rural water supplies in each district is being prepared by the district health officer in consultation with the district board engineer and the president, taking into consideration the importance of the places as regards festivals, epidemics, scarcity, trade, etc. According to the number of schemes which are ready for execution, grants are offered to the district boards, and the works are executed by the district board engineers. In the case of rural water supplies, the construction of sanitary wells is the programme at present before the boards, but in a few instances pumps, cisterns and taps have also been provided. Wherever soil conditions permit, bore wells are recommended, as they are considered to be safer than open wells and other sources, provided the local body undertakes to appoint the necessary staff to maintain them in good order.

No comprehensive drainage exists anywhere in rural towns.

The Government has, however, requested the Director of Public Health to prepare a priority list of places in rural areas urgently requiring a water supply and drainage schemes. The necessary information is being collected from district health officers for the preparation of this list.

MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

The population of the Madras Province is 44.5 millions, 41.5 millions being rural. The key to the greater part of the conditions prevailing in the Presidency is to be found in the conformation of the hill ranges. There are five natural divisions in the Madras Presidency—namely (1) the strip facing the Indian Ocean, which may be called the West Coast ; (2) the central tableland, usually known as the Deccan ; (3) the Agencies ; (4) the East Coast Division proper as far as Nellore district, and (5) the South Division, comprising the remainder of the Presidency. Having regard to our present knowledge of malaria

in the Presidency, we can only say that there seems to be some connection between the distribution of malaria and the above-mentioned natural divisions. The areas hitherto investigated are situated in different remote parts of the Presidency, widely differing from each other in all material aspects, such as climate (including rainfall), physiographic features, social and economic conditions of the people, language, habits and manner of living, average standard of life, occupation and methods of agriculture. The nature of the malaria problem that confronts us is likewise different in different places. The distribution of malaria is mainly rural. Even in the few bigger towns, where malaria occurs to some extent, its existence is due to the surrounding rural conditions. The only exception seems to be the metropolis of Madras, where the transmission is due to *A. stephensi* in the congested town area. But even here it is definitely stated that malaria was carried into the congested city from the rural area to the north and then found its way into the portion of the city in the south which is rural in character to some extent.

Broadly speaking, malaria is prevalent to a varying degree in almost all the districts of the Presidency in one part or another. These areas may be divided into at least four different regional groups.

(a) First, the hilly tracts or plateaux at altitudes varying from 2,500 feet (Sandur Hills) to 5,500 feet (Coonoor), where the fevers generally begin in the first quarter of the year, attaining their maximum incidence only in the second quarter, when the breeding of *A. maculatus* in the ravine streams and seepage channels is also at its maximum. When the rains of the south-west monsoon begin to fall between May and June, the fever season comes to an abrupt end. In the Agency parts, however, which also come under the influence of the south-west monsoons, the June showers start a sharp outbreak in July and then again in October, following the few showers of the north-east monsoon, when *A. culicifacies* is found breeding in large numbers. But in these parts malaria seems to be always present and people contract the infection throughout the whole year. More than one species of anopheles appear to be concerned

as vectors ; this can, however, be determined only by prolonged observation. Altitudes of 2,500 to 3,500 feet provide a mean annual temperature of about 60° or 65° F. and a mean relative humidity of between 60 and 70—optimum conditions ; consequently in the majority of stations at the above altitude malaria is hyper-endemic.

(b) Secondly, the disease occurs likewise, with greater or less severity, in the submontane regions ; the extent of endemicity in the villages is in inverse ratio to their proximity to the hills. Puttur taluk in South Kanara is an example ; fevers generally prevail between the months of February and April. The carrier species here seem to be *A. fluviatilis* and *A. maculatus*.

(c) Thirdly, the inland tracts, in which may be included the large rural tracts and the bigger municipal towns. The problem of malaria here is associated mostly with irrigation channels and wet cultivation. The fields themselves, with their standing water for rice cultivation, can usually be incriminated as the breeding-places for malaria-carrying anophles. Agricultural operations are neither properly controlled nor sufficiently regulated, with the result that the irrigation channels and the adjacent pools are so overgrown with grass and weeds that *A. culicifacies* breeds abundantly.

(d) The fourth area is the coast-line, where malaria is limited to a narrow belt of country on the East Coast north of Madras. No investigation has been carried out in the greater part of the coastal tracts over the entire Presidency, where malaria sometimes exists in virulent form in localised areas. Malaria under this category, as well as under group 3, is supposed to be due to the improvidence of man in excavating pits and quarrying holes. In these regions also the problem of the carrier species has yet to be taken up.

While this division of the distribution of malaria based on physiological zones holds good in general, the absence of the disease in the delta tracts of the Tanjore, Kistna and Godavari districts is significant. The actual factor or factors that control this absence have not been studied.

In view of the limited work of investigation that has yet been undertaken, it is much too early to map out a full geographical distribution of anophelines in the Presidency. No study has yet been made in the Presidency of the carrier problem. Knowledge about the species concerned in transmitting malaria in particular places is lacking, and hence the possibility of species sanitation has not been examined. *A. culicifacies*, which is ubiquitous in its distribution, has been universally blamed and also *A. fluviatilis* in some of the hills; even this charge is not based on the result of dissections but only on presumptive evidence.

The Government having shown a desire to make a beginning, an organisation based on Lieut.-Colonel Russell's scheme was created under a competent malariologist to take systematic steps to deal with the problem of malaria in the Presidency. It consisted of a special malaria officer and an establishment of one assistant surgeon, two laboratory attendants, a clerk and a peon. The officer and his staff took up their duties in July 1927.

Between August 1927 and April 1929, investigations into the malaria problem were carried out in forty areas in different parts of the Presidency—eleven municipal towns, nine union towns (large villages) and twenty rural areas. The problem in the municipal towns seem to be, comparatively speaking, simple, and the solution also is easy with a sustained effort. The problems in the rural areas are of great magnitude and complexity. The following are examples :

Siruguppa in Bellary district. — This is a large village. The problem was due to the irrigation canal and its branches. Retvetting the canal and clean-weeding the channels have proved so successful that even the unhealthy-locality allowance given to Government servants in this place has been withdrawn.

Coastal villages immediately to the north of Madras. — Here the problem is due to the breeding of *A. culicifacies* in innumerable pools and pits in the extensive casuarina plantations. An anti-malarial staff is working in these villages and it is too early to assess the results.

The problem in the submontane tract of South Kanara district is different. The peculiar physical features of this belt of country, consisting of an unending series of ridges and furrows, between the Arabian Sea and the high range hills of the Western Ghats, the abundant rainfall, the very equable climate, the winding hill streams and seepage channels encroaching close upon human habitations—all these contribute to the very severe incidence of malaria, as evidenced by a spleen rate of over 80%. Death rates are considerably in excess of birth rates, and fevers levy a heavy toll every year. The quartan parasite is the predominant type of infection. *A. maculatus* and *A. fluviatilis* are the chief carrier species found, but no species has yet been definitely incriminated. Total eradication of malaria seems impracticable. Control measures can be contemplated only after a full study of the problem both from an engineering and an entomological aspect. An intensive campaign consisting in the free distribution of quinine, totaquina and cinchona febrifuge has been in progress for the past eight years; some analysis of results will be possible only after a few more years of this trial.

Hill malaria, which is retarding considerably the steady opening up of the country and the discovery and exploitation of its vast mineral wealth and other natural resources, occurs in various places, including the manganese mining area in Sandur and the coffee and tea planting areas in the Western Ghats. Systematic enquiry into the malaria problem has not yet been made in these parts except with a view to safeguarding the interests of the mining or tea syndicates. It is proposed to take up the study and control in one or two typical areas shortly with the help of an annual grant from the Government of India of Rs. 40,000, supplemented by an equal grant from the local Government, if sanctioned.

By far the most intractable malaria inroads occur in the hilly parts of the Eastern Ghats in the three northernmost districts of Ganjam, Vizagapatam and Godavari, commonly known as Agency tracts. The malaria in these regions is severe, and cases of black-water fever occur commonly.

Malaria in the Agency tracts stands out decidedly as a separate problem and its gravity has been brought to the notice of the

Government. The proper way of attacking it here seems to be the formation of a committee on which a malarial engineer, a geologist, an agricultural expert, an entomologist and an expert hygienist trained in malariology should be represented to study the question and devise and carry out control measures.

Constructional and Irrigation Malaria.

The construction of the biggest dam in the world was started in 1926 at Mettur on the River Cauvery. The work was to continue for a period of eight years in a place where malaria was rife. The Director of Public Health, anticipating a breakdown in the programme if malaria was not controlled, launched an anti-malarial campaign, which was carried out by a specially trained staff with very successful results—a unique example of efficiency and economy in constructional malaria control. The progress of the engineering works was not delayed by malaria even for a day, and the labourers were not incapacitated, only a few being absent occasionally from work for a day or two.

But the problem of malaria caused by irrigation schemes has not been considered in advance everywhere. A portion of the area coming under the Mopad project consists of groups of villages situated more or less closely on the banks of the Manneru River. It is universally believed that the date of the first noticeable onset of fevers coincided with the construction of the dam across the river. The problem of malaria in the Mopad area is thus seen to be intimately connected with the unhealthy condition in which the bed of the Manneru river and the irrigation channels are maintained. In another area—the villages near the Cuddapah-Kurnool Canal system—malaria became severe after the construction of the canal. Instances of smaller irrigation areas where malaria is connected with irrigation can also be given. The most striking example of a serious malaria problem in an irrigated area is that of Pattukottai taluk in Tanjore district. The Cauvery-Mettur project, which cost about 7 crores, or 70 millions, of rupees and which was completed in 1934, is intended chiefly to irrigate a dry area—Pattukottai taluk—which depended entirely upon rain in the past. The idea was to bring the dry area under paddy

cultivation. In this dry country, where malaria was unknown, the disease has made a sudden appearance and is trying to establish itself permanently. The problem is now being studied.

The Tungabadra project is another major project at present under consideration. But, in view of the occurrence of malaria over wide areas as a result of irrigation schemes, the Government has decided to refer the project to the Public Health Authorities for a report on its malarial aspect. This problem is also to be taken up for study shortly.

The crux of the malaria problem on the Presidency seems to be in the areas under smaller or bigger irrigation projects. In a purely agricultural country like ours, where more than 95% of the population depends for its livelihood on what it can grow on the land, the problem assumes immense proportions. Measures for keeping the numerous irrigation channels clean—that is, control or prevention of weedy edges and abolition of seepage—or for fixing the areas under cultivation, where feasible, beyond the radius of half-a-mile of the village site, are often put forward. But owing to the conflicting interests of the authorities concerned, no progress has been possible. An economic solution of the seepage problem in irrigation channels will be near realisation if the researches in North India on the chemical treatment of canal beds so as to render them impervious turn out to be successful. But a solution of the problem of the water edge in irrigation channels seems to be remote. Even if a solution is found, the application of any method will still be difficult until it is realised that irrigation works need not be kept in such a state of utter neglect as to be a constant source of danger to the general well-being. If an irrigation project turns out to be a “death trap”, it is certainly an example of bad engineering.

Fully recognising that measures for the complete destruction of mosquitoes would take several years, since they depend on the mutual adjustments of responsibility and of financial resources between the local authorities and the central Government, the latter has embarked since 1928/29 on an experimental scheme consisting of the free distribution of quinine with a view to affording much-needed relief to the sufferers. It is too soon to give a final opinion as to the usefulness

of the scheme. Nevertheless, it is regarded with grateful feelings and as a blessing by those who have taken advantage of it. In this province, about $1\frac{1}{2}$ million people are benefiting by the scheme, and among these about 8% actually receive treatment. Approximately Rs. 40,000 are spent annually by the Madras Government for this purpose. In addition, the Government of India has also placed at the disposal of the Madras Government 4,000 lb. of quinine for free distribution.

Out of the Government of India grant for rural amelioration given in 1935, the following schemes were completed in July 1936 :—

		Rs.
(i) Chintapalle	{ Drainage }	13,000
(ii) Gudalur	{ }	13,000
(iii) Coastal area north of Madras	{ Filling of pits }	18,000
(iv) Rameswaram Island	{ }	6,000
Total		50,000

The success of the operations in the above places still remains to be seen.

The Government of India has again offered to Madras a grant of Rs. 40,000 a year for five years, provided the local Government contributes an equal amount every year, for practical malaria control measures. Proposals for the utilisation of the grant are under consideration.

For an investigation into the natural history of epidemic malaria, which periodically occurs in the ceded districts, and the formulation of methods of forecast and control in future, the Government has sanctioned an investigation unit for a period of two years. The unit has just started work in Bellary.

The policy of the Government in the control of malaria is as follows :

- (i) To have a malaria survey carried out by the malaria officer and to forward a copy of his recommendations to the local body concerned for necessary action ;
- (ii) To finance the cost of anti-malarial measures in areas under Government charge ;

(iii) To consider the question of meeting a one-third grant towards the cost of approved and sanctioned schemes;

(iv) To provide facilities for the free distribution of quinine in approved areas;

(v) To sell quinine through post offices at reduced prices. About 1,500 lb. of quinine are sold per annum through this agency;

(vi) The Government has constituted a Malaria Sub-Committee of the Public Health Advisory Committee of the Legislative Council. This committee advises the Government on matters of general policy and procedure connected with the control of malaria in the Presidency.

Malaria in the Madras Presidency is widely distributed and presents complex problems for solution. Its eradication can only be achieved if serious efforts are made. With a policy, a programme and sufficient perseverance, a solution should not be far off. Piecemeal investigations and tinkering with the problem here and there are not only futile but cause disappointment. The establishment of a sound permanent organisation for continued investigation and research into the problem and for carrying on a systematic campaign against the disease is the desideratum and need of the hour. A start has been made and it is hoped that there will be an improvement in the near future.

Plague.

Plague broke out in this Presidency in an indigenous form in 1898 and spread very quickly to all the districts round Mysore. Although at one time or another indigenous plague has occurred in every district in the Presidency, it never established itself along the East Coast. At present, the disease is practically confined to Cumbum Valley, in the Madura district, and the districts round about Mysore, where it is even limited to taluks which form part of the Mysore Plateau. These areas may be considered as the endemic zones.

Mortality from plague (1916 to 1935) in the Madras Presidency.

1916	1917	1918	1919	1920	1921	1922	1923	1924	1925
11,498	24,708	12,859	5,658	14,652	11,875	9,193	12,110	3,922	2,014
1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
2,143	2,457	2,106	1,801	1,459	1,073	1,561	2,591	2,358	645

It will be seen that, in the year 1924, there was a very large decrease in plague mortality. Since then, the mortality has remained low and has steadily fallen, except for short rises in 1932-1934. These rises cannot be regarded as of any significance, and it may therefore be said that plague mortality has shown a steady downward trend in the province from 1924. The mortality in 1935 is the lowest on record since plague broke out in the Presidency.

There is no permanent staff anywhere in the Presidency for plague work.

All staff employed in connection with plague is temporary, and the Government renews the sanction for such establishments every six months. The strength of the staff depends on the extent and severity of the epidemic. In taluks like Kollegal of Coimbatore, Hosur of Salem, Cumbum Valley in Madura, Western taluks in Bellary district, where plague is more or less endemic, the plague staff, though temporary, is continued from year to year without any prospect of incremental scales of pay, promotion, security of tenure and other privileges attached to permanent service. Naturally, such men are ever on the look-out for better employment. With changing personnel, the experience gained is lost. It would therefore seem desirable that, in endemic areas at least, permanent personnel should be employed to secure the maximum efficiency. It may be generally stated that the response of the local bodies in this direction is very limited.

The collector in each district is made responsible for anti-plague measures, while the Director of Public Health controls the plague budget.

On the occurrence of plague in an endemic area, the existing plague staff adopts anti-plague measures under the direction and supervision of the district health officer, subject to the general control of the collector. The revenue divisional officer and other revenue officers render all necessary help in the carrying out of the measures. In non-endemic areas, the existing health staff attends to plague work till the collector, in consultation with the district or municipal health officer, recruits the necessary personnel.

Inoculation is purely voluntary and all the persuasive powers of the health staff and the influence of the local revenue officials are required to induce the population to submit to it. Where it is specially necessary to encourage inoculation, the collector may grant subsistence allowance at rates not exceeding four annas a day for an adult and two annas a day for a minor, who may be temporarily incapacitated for work as a result of inoculation. Such an allowance is not paid to any one individual for more than three days. The plague inspectors and sanitary inspectors (trained in inoculation work) and medical officers conduct the inoculations. Where inoculations are not popular, they are insisted upon under threat of evacuation under the Plague Regulations.

At present, cyanogas fumigation of rat burrows is extensively carried out as a raticidal and pulicidal measure. To keep down the number of rats and fleas as far as possible in endemic areas, fumigation is carried on throughout the year on a half-contribution basis between the Government and local bodies.

Barium carbonate baits prepared with the flour of local cereals are also commonly used for the destruction of rats.

There is some rat-trapping ; the type of trap commonly used is the " wonder trap ".

Disinfection.

The flooring and walls of houses are disinfected with kerosene oil emulsion ; but, as there was a danger of the misuse of the mixture, cresol is now largely employed. If the weather and temperature conditions are favourable, sun disinfection is occasionally adopted, the thatch or tiles being removed. In the case of pneumonic plague, infected sheds are destroyed. Personal effects, grain and other goods from plague-infected areas are disinfected by sun-disinfection on specially prepared platforms. This was the method employed in the past ; but, owing to its uncertainty, resort is now had to fumigation with cyanogas under oiled tarpaulins. This method, besides being effective, is one that can be carried out quickly and in all seasons (Figure 7).

To prevent the spread of plague all flea-infected articles should be disinfected at the infected station itself before being



Figure 7.

Kumily : An experimental HCN fumigation chamber. Grain-loaded carts let inside for fumigation.

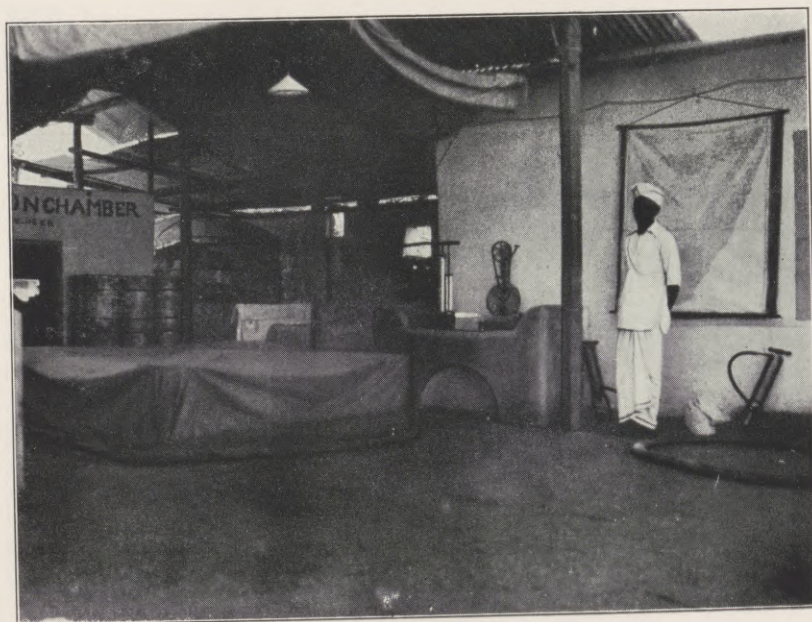


Figure 8.

Cumbum : Plague Research Laboratory. Fumigation of grain-bags under tarpaulin for field use.



Figure 9.

Kumily : Note the steam disinfestation equipments, mainly meant for personal effects.



Figure 10.

A roadside traffic control by plague staff on the outskirts of an infected village. Note, on the right, grain-bags being fumigated under tarpaulin.

conveyed from one place to another within the province, or from one province to another. I would urge that this should be the future policy. The present unrestricted transport of flea-infested articles from plague-infected areas has led to the spread of plague. Instead of concentrating the measures at the actual source, the adjacent local bodies are allowed to incur expenditure in disinfecting plague-infected articles before they are allowed into the town. This policy has proved a complete failure (Figures 8-10)

All the above measures are relied upon ; but the results of inoculation and the cyanogas fumigation of rat burrows are most satisfactory.

Controlled evacuation is practised. If the population shows apathy to inoculation, then compulsory evacuation is ordered by the collector. However, before issuing or sanctioning an order for compulsory evacuation, the collector must (a) satisfy himself that such evacuation is necessary to prevent or check the further spread of the disease or is in the interests of the affected population, having regard to climatic conditions ; (b) either provide within a reasonable distance adequate and suitable shelter and the necessary water-supply for the persons evicted or satisfy himself that such shelter and water supply will be provided by private agency ; and (c) make the necessary arrangements for watch and ward.

In the towns and larger villages, evacuation has been unpopular owing to the heavy cost involved in finding suitable ground for hutments and providing adequate housing accommodation for the evicted inhabitants. The inconvenience experienced in the wet and cold weather, when plague usually breaks out severely, and the dislocation of traffic and trade are other factors which render this measure unpopular.

Movements of persons and grain, etc., are controlled by posting observation staff on the various road and railway routes. But, as evasion is largely practised, and human nature being what it is, I am doubtful if any useful purpose is served by such measures.

During inter-epidemic periods, rat destruction and propaganda through lantern lectures, cinema films and posters are the

only important measures resorted to. Where possible, attempts are made to enforce permanent measures for the prevention of plague.

Pneumonic Plague.

This form of plague occasionally manifests itself in short, sharp, isolated outbreaks which seem to die out almost as quickly as they appear. There have been seven occasions in the last twenty-two years when pneumonic plague has broken out, but the infection has not spread beyond the group of individuals in contact with the first case. These outbreaks have occurred in districts with varying climates, such as the Nilgiris, Malabar, Chingleput, North Arcot and Chittoor.

Plague Research Work.

Field investigations into the epidemiology of the diseases commonly prevalent in the Presidency are carried out by a research health officer of the grade of a first-class health officer.

Plague as an epidemic disease has been an urgent problem in this presidency and was accordingly taken up for investigation. The pioneer investigations of the Royal Commission in India on its epidemiology are the key to existing knowledge on the subject. It is still considered that the available preventive methods of bubonic plague are far from satisfactory, and several factors connected with the epidemiology of endemic plague still await solution. With the financial aid of the Indian Research Fund Association, a rat-flea survey of the Madras Presidency was commenced in 1928 and completed in 1930. This extensive regional survey has shown conclusively that *X. cheopis* is by far the most important carrier of plague, and that this flea is able to adapt itself to considerable varieties of climatic conditions. *Astia* flea doubtless plays a subsidiary part once the epizootic is initiated by *cheopis*, or by itself when its critical index lies above 6 or 7. The risk of *cheopis* fleas being conveyed to fresh areas through the medium of cotton and grains was clearly recognised during these surveys. The surveys have been of great practical service for the adoption of preventive measures.

As a sequel to these surveys, field investigations were directed mainly to the study of the recrudescence problem. Cumbum Valley, in Madura district, was selected for this purpose, as it was naturally protected against invasion of plague from outside, while plague has been endemic within the valley ever since 1920. The chief rodent species concerned in the local plague epizootics are the house rats, bandicoots and house mice, and the chief flea species concerned in plague transmission are *X. cheopis* and *X. astia*. Monthly data of specific rat-flea indices have been collected for a period of about seven years. These figures show clearly that the plague season corresponds closely with the season of maximum *cheopis* prevalence, while *astia* fleas appear to play only a passive rôle. The seasonal recurrence of rat plague in the area has been found to be really a case of local recrudescence. The off-season is bridged over by smouldering infection among rats in villages where epidemics abruptly terminate owing to the onset of less favourable weather conditions during the summer months. The rat species of Cumbum Valley do not show any degree of immunity tending to a natural arrest of epizootic plague. Occasional chronic plague manifestations have been noted in rats, but it has not been possible to prove from any of those instances that such rats may be responsible for suddenly causing acute plague later and thus carrying over infection.

Large numbers of the common wild rodents were also examined to see if they were in any way the off-season reservoir for plague. Sufficient data are now available to show that this is not so under local conditions.

Repeated study of rat-fleas trapped during the off-season from rat-nests in underground burrows furnished strong presumptive evidence that infected rat-fleas which æstivate in the cooler and more humid conditions of burrows can easily survive with infection the usual short off-season of the Cumbum Valley. With a view to testing this hypothesis, attempts were made to study the temperature and saturation deficiency of the sheltered atmosphere of rat-burrows as compared with the exposed outside atmosphere. These observations have clearly proved that favourable incubating climatic conditions (temperature and saturation deficiency) prevail in rat-holes,

as against wide diurnal variations outside. Model rat-proof huts were constructed and attempts were made to study under approximately natural conditions the longevity of infected fleas harboured in rat-burrows in these huts. It was repeatedly shown in these carry-over experiments that rat-fleas capable of transmitting infection may survive even after a period of one month's starvation while harboured in rat-holes. Thus the evidence so far collected points to the rat-flea as a possible factor in the recrudescence of plague.

Based on these findings, a campaign for the disinfection of rat-holes was organised during the off-season in a selected village which was presumed to carry over the epidemic. The method employed was to fumigate all rat-holes with cyanogas "A" dust. The results were very encouraging. The village of Cumbum, which was so dealt with, escaped infection, while all the neighbouring villages suffered from severe plague. Systematic fumigation was thenceforth extended to all infected and threatened villages of the valley, and, as a result of this intensive campaign for the last three years, the total plague of the area has been reduced to a level never reached before. During 1935 and 1936, the whole valley was free from human plague for three and a half and two months respectively. Such total freedom for even a short period is an entirely new feature in the history of plague in Cumbum Valley. Experience shows that fumigation yields the best results where early information about rat-falls can be obtained, so as to enable a timely attack to be made on the focus of infection. Fumigation, however, does not render an area immune from further infection; but, since it deals with both rats and fleas, it is undoubtedly the best of all available temporary plague measures.

Fumigation has also been found to be very efficient in disinfecting consignments of bagged grains, personal effects, etc. The method found best under field conditions is to pack the bags with enough interspaces over dry ground, cover it with tarpaulin rendered comparatively air-tight by oiling, ring the edges with earth and fumigate from different corners with cyanide gas (cyanogas or calcid). A dosage of about 4 to 6 oz. of HCN (equivalent to 1 to 1½ lb. cyanogas "A" dust or ½ to ¾ lb. calcid) per 1,000 cubic feet and an exposure

of three hours will ensure sufficient penetration for the necessary disinfection.

The comparative merits of several other methods of disinfection of grains, etc., such as (a) sun disinfection, (b) disinfection by hot air, (c) steam disinfection, (d) sulphur dioxide fumigation and (e) hydrogen cyanide fumigation, were investigated. The results show that hydrogen cyanide fumigation is by far the most efficient.

Observation of the factors leading to the spread of plague is being carried on. Repeated attempts have been made to detect loose fleas in grain consignments at the Kumili frontier, but they were mostly negative. This is perhaps due to the fact that most of these consignments were from rat-proof godowns at Cumbum. However, the possibility of such transference of fleas was indirectly proved on three occasions by artificially infesting grain-loaded carts with fleas and recovering every time over 50% of them after a night's journey. The fact of this possibility of importation of fleas through grain is further amply proved by the fact that there was heavy *cheopis* infestation of rats examined from the northern half of the Peermade taluk adjoining the Cumbum Valley, while they were conspicuously absent from the Southern half of the same taluk.

Ankylostomiasis.

A detailed hookworm survey of the Presidency was completed by 1927 by the Ankylostomiasis Campaign of the International Health Board under the Rockefeller Foundation of America, and the immensity of the problem was clearly demonstrated. As a result, the Government took over all further work from them and started the Rural Sanitation Campaign in 1928 for the prevention and control of hookworm infection in the Presidency. The rural sanitation staff consists of six rural sanitation units. Each unit consists of a health officer, a health inspector and a peon. These units are stationed in a district for about three years. The duties of the unit are to make hookworm survey by microscopic examination of the faeces, to conduct mass treatment for hookworm, to advise local bodies on soil sanitation and the provision of approved types of latrines,

and to conduct propaganda on the importance of soil sanitation. Each unit is equipped with a cinema apparatus and films on public health subjects, as well as with borers for constructing bore-hole latrines in rural areas. The intensive work done by the unit is generally appreciated by the local bodies and the unit is withdrawn after a stay of three years in a district.

Subsequently, this work is taken up by the regular public health staff in the district.

Recently, a sum of 2.75 lakhs was allotted by the Government of India for this province for soil sanitation work. A taluk has been selected in each district and it is proposed to put up bore-hole latrines in these taluks in as large a number of villages as possible. The work is in progress now, and, from the reports so far received, these types of latrines are becoming popular, if we can judge from the demand for private latrines of the same type. Reinforced concrete squatting-slabs are sold at half cost to deserving individuals for the purpose of encouraging the provision of private latrines.

*Tuberculosis*¹.

The Tuberculosis Committee of the King George V Thanksgiving Anti-Tuberculosis Fund is in charge of an anti-tuberculosis campaign in the Presidency. The Director of Public Health is the Chairman of this committee. Its activities are mainly directed towards an educative campaign on tuberculosis.

District tuberculosis committees have been organised in eighteen districts for the furtherance of this branch of work. The district health officer is the secretary of the district committee. The District Tuberculosis Committee, Coimbatore, is taking steps to start a tuberculosis sanatorium in that district.

Leprosy.

The anti-leprosy campaign is under the control of the Surgeon-General with the Government of Madras (see his note). There are six group leprosy officers, who supervise the work in the

¹ See also General CONNOR's note.

leprosy clinics, train medical men in the diagnosis and modern methods of treatment and generally assist in organising leprosy relief in the Presidency. The Public Health Department helps in the furtherance of the work through propaganda, registration of cases and occasionally survey.

The number of leprosy clinics in the Presidency during 1935 were 440, including Government, local fund, rural, mission and private aided institutions. There are twelve leper asylums in the presidency, with accommodation for 2,290 lepers. Of these, eleven are aided by the Government and one is private.

In several districts of the Presidency, district Leprosy Relief Councils have been formed, with the collector as president and the district health officer as secretary, to give sufficient impetus to leprosy relief work and to co-ordinate all activities in this direction. The district council pools all the resources in the district and guides the work. The offer of grants from the Silver Jubilee Fund has given a further impetus to the anti-leprosy campaign in several districts.

Smallpox.

Vaccination and re-vaccination are compulsory in all municipal towns, pre-union panchayats and almost all the villages, except the Agency areas. Re-vaccination once in ten years has been made compulsory from 1932, and in the City of Madras from June 1936 (for vaccination work, see section on District Public Health Organisation).

Glycerine lymph is alone used and is supplied free of cost by the Government from the King Institute of Preventive Medicine, Guindy.

The village headman continues to maintain the unprotected children's registers, which are scrutinised by the public health staff.

Routine vaccination work is suspended during the hot weather months—April, May, June and July—and this period is utilised by the vaccination staff for bringing the village vaccination and vital statistics registers up to date.

Persons who refuse vaccination are prosecuted under the Local Boards and Municipal Acts.

*Cholera.*¹

Usually, cholera breaks out in the northern part of the Presidency about July, August and September, a few weeks after the onset of the south-west monsoon (rains). The ceded districts also get infected sooner or later. Following closely the north-east monsoon (rains), the southern part of the Presidency is affected in November, December, January and February. With the onset of summer (April, May, June), the epidemic is at its lowest and practically comes to a standstill.

In the Cauvery delta, cholera usually prevails almost throughout the year; 1932 and 1933, however, proved an exception to this rule, cholera being practically absent in this area.

A study of the various epidemics has shown that the Presidency is invaded by cholera through two routes: (1) through the ceded districts extending southwards, (2) through Ganjam to Vizagapatam and West Godavari.

A tremendous impetus is given to the advancing cholera wave by the numerous fairs and festivals in the infected areas, particularly the large pilgrim centres, which are of importance to the whole of India. The recent introduction of rapid means of transport and the numerous canals in the deltaic areas serve as additional means for the rapid spread of the disease.

Investigations by Colonel RUSSELL, I.M.S., have revealed that meteorological conditions have a close bearing on the seasonal incidence of cholera in different parts of the Presidency, and that there is also a six-yearly periodicity for the disease in the Presidency.

As soon as information is received that cholera has broken out in a village, the health inspector, first and second class vaccinators and the health officer visit the villages and carry out preventive measures, such as disinfection, chlorination of water supplies and anti-cholera inoculations. The infected area is divided into small compact blocks and sufficient staff is posted to allow of visits and revisits to infected villages.

¹ See. A, J.H. RUSSELL: "A Geographical Survey of Cholera in the Madras Presidency from 1818-1927", Madras, 1929.

at least once every 24 to 48 hours. The staff is fully equipped to carry out preventive measures and to afford simple treatment. Besides enlisting the co-operation of medical officers attached to the Government, local fund and rural medical institutions, health inspectors themselves carry out a large number of inoculations and this has helped to prevent delay. Bili-vaccine is also administered.

Expenditure in connection with these preventive measures is met out of the funds of the district board and, in special cases, the panchayat boards as well. These measures have generally been entirely successful in controlling the epidemic. The total number of inoculations carried out during the last two years (1934 and 1935) was 2,659,993.

The use of cholera bacteriophage, which was tried both as a curative and a prophylactic, was given up during 1935, as the results were not conclusive. Full reports on the experiments conducted under the auspices of the Indian Research Fund Association have already been sent to this body.

The patients are usually treated with pro diarrhœa and permanganate pills ; but, when medical aid is available, saline is administered. This mode of treatment is, however, comparatively rare, except when patients are isolated and treated as in-patients.

The Government has recently (1936) issued rules for combating cholera in local board areas.

19. NOTE ON PUBLIC HEALTH AND MEDICAL SERVICES IN THE NORTH-WEST FRONTIER PROVINCE

by

Lieut.-Colonel W. E. R. DIMOND, I.M.S., Assistant Director of Public Health, North-West Frontier Province.

General.

The total area of the North-West Frontier Province as recorded by the Survey of India is approximately 36,356 square miles. There are two main political divisions :

(1) The trans-frontier area containing the five political agencies—namely, Malakand, Khyber, Kurram, North Waziristan and South Waziristan Agencies and district tribal areas—the inhabitants of which are subject only to the political control of the Governor in his capacity as agent to the Governor-General.

(2) The five regularly administered districts of Hazara, Peshawar, Kohat, Bannu and D.I. Khan.

Population.

The total population enumerated in the North-West Frontier Province, according to the last census (1931), is 2,471,527 persons, of whom 1,360,453 were males and 1,111,074 females. The enumerated population was the *de facto* population in the five administered districts and trans-frontier posts only. The population of the transborder area is estimated as 2,212,837 persons.

Literacy.

The proportion of males returned as literate is 91 per mille, while that of females is only 12. It will be seen that, in comparison with the rest of India, the North-West Frontier Province is well down the list. As can be seen by the above figures, the province is very backward in education, and consequently great difficulty is encountered in running public health measures on modern lines.

Acts.

The Foods and Drugs Act and the Vaccination Act are the only two which are applicable to all the districts in the province under which public health measures are run.

Health Department.

The Inspector-General of Civil Hospitals, who is administrative medical head and responsible for the organisation and working of institutions and personnel for medical relief, is also Director of Public Health. He is assisted by an Assistant Director of Public Health, who is a wholetime health official and also public analyst and bacteriologist of the province.

Up to date, there are no district medical officers of health. A scheme is under contemplation of appointing district medical officers of health in the five settled districts of the province, and, with a view to this measure coming into force, two medical officers are being sent annually to Calcutta for the Diploma in Public Health.

Vital Statistics

The population of the settled districts only is taken into account, as no accurate information is available from the trans-border tribal tracts.

Compared with the rest of India, vital statistics in the North West Frontier Province present several features of interest. It is one of the provinces which record the lowest rates of births, deaths and infantile mortality. Its birth rate per mille is 32.22 ; its death rate is 19.42 ; the lowest in India, if Burma be excluded ; its infantile mortality rate is 132.15. The most singular feature, however, is the large proportion of male to female births, the ratio being 130.99 males to 100 females. This again is the highest in India. This may be due partly to the failure to register female births.

Laboratory.

The provincial laboratory in Peshawar acts as the public health bacteriological laboratory of the province.

Medical Facilities.

During the malarial season, free quinine is distributed in rural areas through the agency of district boards, deputy commissioners and schoolmasters.

Subsidised Medical Practitioners and Subsidised Dais.

The schemes of subsidising private medical practitioners and trained dais, whereby they should settle in rural areas and meet with the growing demand for medical aid, were started in the province in 1933 and 1934 respectively.

Sixteen private medical practitioners and twenty dais have since been subsidised in various selected villages. The schemes are working well and are being extended year by year.

A subsidised medical practitioner is paid a subsidy of Rs. 40 per mensem and medicines worth Rs. 200 per annum are also given to him for free issue to poor patients. He also visits adjacent villages within a radius of five miles. Since the inauguration of the scheme 146,773 patients have been treated by the subsidised medical practitioners.

Each subsidised dai is given a subsidy of Rs. 25 per mensem and is required to attend labour cases on a nominal fee not exceeding Rs. 2 to Rs. 5 per case, according to circumstances. She is expected to educate the women of the village in the matter of pre-natal and post-natal care and also assist in the local civil hospital where there is one. All complicated labour cases are advised by her to be taken to the nearest zenana hospital for treatment.

In 1936, a scheme was adopted of issuing milk as a midday meal to all children of the high schools in Peshawar. It has proved very successful and to-day 3,463 children are taking milk every day. The scheme is gradually being extended to all the schools in the municipal towns in the province.

Dais Training Centres.

The Red Cross Dais Training Centre and Child Welfare Centre in D.I. Khan was provincialised in July 1936 and another centre has been opened in Peshawar City. Twenty-three dais are under training in these two institutions. The course is for twelve months. The successful candidates return to their native towns and practise.

Medical Examination of School-Children.

The scheme of medical inspection of school-children was started as an experimental measure in Peshawar municipal town in the year 1927 and has proved successful. The scheme has since been extended to Bannu, D.I. Khan, Kohat and Abbottabad. It is hoped that gradually it will be extended to the schools in the rural areas. The scheme embodies a monthly medical

inspection of each child with a view to the prevention and cure of disease ; the assured treatment of affected children ; quarterly reports of the above results, which will be combined to form an annual report ; a monthly inspection of school premises.

General Sanitation.

The Assistant Director of Public Health tours frequently in the province, inspects villages and towns and makes recommendations for improvements in sanitation and drainage, etc., to the district boards and municipalities. During the year 1935, the district boards and municipal committees spent Rs. 81,505 and Rs. 4,35,329 respectively on sanitary works and conservancy charges. Special help out of the annual sanitary grant which is at the disposal of the Director of Public Health is also given to rural and municipal areas on demand for sanitary purposes.

Water Supply.

A sum of Rs. 61,096 was spent by municipal committees and district boards on water-supply schemes during the year 1935.

Epidemic Diseases.

The province is visited from time to time by epidemics of plague, cholera and smallpox.

Preventive Measures taken against Epidemic Diseases.

Whenever plague, cholera or smallpox in epidemic form threatens to develop in any village or town, extra medical staff is at once sent. The Assistant Director of Public Health accompanies them and starts inoculations. Great trouble is experienced in getting people to come forward for inoculation ; but when a Jirga of the prominent Khans and the medical authorities is formed, usually this difficulty is got over.

Fevers.

Deaths from fevers in the North-West Frontier Province are very high. The reason for this is that a large percentage of deaths under this head are really due to tuberculosis.

Tuberculosis.

Tuberculosis is on the increase in this province. A house-to-house census was taken in the city of Peshawar recently and it was found that one in every three houses was infected by this fell disease. There is no sanatorium in this province, but we hope in the near future to build one. There exist several excellent sites for such an institution.

Plague.

Fortunately, we have had no plague since the year 1927, when 232 deaths occurred.

Cholera.

Small outbreaks of cholera occur from time to time and have always been imported from other provinces. The last epidemic broke out in the year 1935 in three districts of Peshawar, Kohat and Bannu and was responsible for 478 cases with 245 deaths. The year 1936 was free from cholera until the beginning of November, when a few cases occurred in villages surrounding Tank and D.I. Khan police-stations. The infection was carried by the Powinda Kirri migrating from the southern provinces of Afghanistan, where cholera was rife. Prompt measures were taken to check the disease and after about ten days the epidemic ceased. Control of the drinking-water and inoculations were the two measures principally adopted.

Smallpox.

The vaccination season in this province starts from October 1st, and the vaccinators travel from village to village and vaccinate all the children. It is gratifying to note that the people of this province realise the value of vaccination and voluntarily come forward to get their children vaccinated. Purdah is our chief obstacle in this province, and, although Acts may be put in force, it is very difficult to get the children vaccinated

by force. Persuasion is our only hope. The following number of vaccinations were performed during the year 1935/36 :

	Primary	Re-vaccinations
Settled districts .	126,488	85,557
Agencies	14,384	14,081

The vaccinators of the agencies where the Vaccination Act is not in force are recruited from the tribes themselves.

20. NOTE ON MEDICAL AND PUBLIC HEALTH ORGANISATION IN ORISSA,

by

Lieut.-Colonel G. VERGHESE, I.M.S., Director of Health and Prisons Services, Orissa.

Population : 8,174,000.

Districts : 6.

The new province of Orissa was only created with effect from April 1st, 1936, and therefore it has scarcely had time to organise a medical and public health organisation of its own, according to the special needs of the province as a whole. The Bihar and Orissa system, with all its rules, regulations, etc., continues to be in force in North Orissa and the Madras system in South Orissa. Similarly, the Central Provinces procedure is in force in the small area transferred from that province, the Nawapara sub-division, and which now forms a part of the Sambalpur district.

For administrative reasons, the following parts of the province are considered as partially excluded areas :

- (1) Sambalpur district ;
- (2) Angul sub-division of Cuttack district ;
- (3) Phulbani sub-division and the agency tracts of the Ganjam district ;
- (4) The Koraput district.

These are comparatively undeveloped tracts and in most parts peopled by primitive types of people with their peculiar social customs and manners, and, with their poor economic development, the laws and regulations affecting administration of these partially excluded areas are somewhat different from what obtains in other parts of the province.

Under the existing Acts and regulations, the district boards are now responsible to the Government for the health and sanitation of their districts.

I. MEDICAL ORGANISATION.

The Director of Health and Prisons Services is the administrative head of the Medical Department.

The province has at present a cadre of 135 Government medical officers, 99 of which are sub-assistant surgeons.

Hospitals and dispensaries in the province are classed as follows :

I. Public State hospitals and dispensaries entirely maintained by the local Government	33
II. Special State hospitals— <i>i.e.</i> , for police, forests, canals, etc.	18
III. Local fund hospitals, the responsibility for which rests with district and municipal boards, but which usually receive State aid and supervision	100
IV. Private-aided hospitals	4
V. Private (non-aided hospitals)	6
VI. Railway hospitals (these are independently maintained by the railways)	6
VII. Rural dispensaries (these dispensaries are run by private practitioners who settle down in selected villages and receive a subsidy from the Government and local bodies)	8

Class III hospitals and dispensaries are almost all located in rural areas and are entirely managed by the local bodies. The local Indian doctors appointed to this class of hospitals are

local body employees, and are of the same qualification as Government sub-assistant surgeons. The local bodies receive from Government, directly or indirectly, financial help in the shape of money or medical officers for the maintenance of these dispensaries. The total number of beds available in these hospitals and dispensaries is 1,044. Roughly speaking, there is one medical institution for every 43,859 of population, the total number of medical institutions, including all kinds of hospitals and dispensaries, being 182 for a total population of 7,982,266 in the province.

Following the Madras scheme of subsidising rural medical practitioners, of which there are already eight in South Orissa, a scheme has been submitted to Government for establishing ten rural subsidised dispensaries in North Orissa in the first instance as an experimental measure. These dispensaries, if approved and sanctioned by Government, will be located in villages far away from any dispensary.

Budgets.

Government expenditure on medical relief, excluding buildings, is Rs. 8,61,475. The following statement shows the income of the district boards and expenditure on medical relief :

Name of district	Gross income Rs.	Expenditure on medical relief Rs.	
Cuttack	6,89,684	63,195	
Puri	3,49,728	47,142	
Balasore	4,08,323	42,544	
Sambalpur	2,53,768	29,386	
Ganjam { (1936/37) }	5,22,080	1,07,710	} Both medical and public health
Koraput { }	94,234	9,096	

Medical Education.

There is a Medical School at Cuttack which trains students for the L.M.P. qualification. It is in charge of an I.M.S. officer, who is also the civil surgeon of the district. It is proposed to have a whole-time superintendent for the school and also to create a separate cadre of teachers for the school. There is a large hospital attached to the school with about 200 beds.

Hospitals.

Besides the Cuttack General Hospital and the district headquarters hospital at Puri, Balasore, Sambalpur and Berhampur, there are no special hospitals and institutions for mental disease, tuberculosis, radium treatment and women's diseases.

Accommodation has, however, been reserved for patients of this province in the Indian Mental Hospital, Kankee, Ranchi, for mental cases and at the Itki Sanatorium, Ranchi, for tuberculosis.

Public Health Organisation.

(a) *Public Health staff maintained by Government.*

(1) *Director of Health and Prisons Services.* — With the separation of the province, the Departments of Jail, Medical and Public Health have been combined and placed under one I.M.S. officer, who is designated the Director of Health and Prisons Services. Before the separation, the three departments had each a separate officer. The director is head of the three departments and is responsible to Government for their administration. He also advises the Government as well as local bodies on technical subjects.

The Director has a personal assistant recruited from the provincial subordinate Civil Service to assist him in his office routine work.

(2) *Assistant Director of Public Health.* — This officer has not yet been appointed.

(3) *Three Medical Officers of Health* possessing special public health qualifications. Two of them have been appointed as health officers of the two important towns of Cuttack and Puri respectively and the third one is the district health officer of Ganjam.

(4) *School Medical Officer* possessing public health qualifications. He visits all high schools, delivers lectures on hygiene, inspects all the scholars for physical defects, maintains various forms prescribed for height, weight and chest measurements for various age-periods and reports on the general sanitation

of the schools and hostels attached to it. In hostels he also sees the general diet given to the boarders and advises the school authorities where there is deficiency. He also visits such middle English schools as are within easy reach of a high school.

Since 1935, the medical inspection of schools has been extended to all the middle English and middle vernacular schools in rural areas of North Orissa. This work is not, however, done by the Government school medical staff but has been entrusted to the district board health staff and dispensary doctors. Their reports are submitted to the Director.

In South Orissa, though there was never a whole-time medical officer, a system had been evolved by which medical records of the students were maintained with the help of the local doctors, paid partly by medical fees of the scholars and partly by Government grants. The Government grants were, however, discontinued in 1932 as a measure of economy and have not been restored so far. It is now proposed to entrust this work to the school medical officer in North Orissa.

(5) *Assistant School Medical Officer.* — An L.M.P.

(6) *Lady School Medical Officer.* — A proposal with detailed scheme has been submitted to Government for her appointment.

(7) *Two Second-class Health Officers.* — L.M.P.s.

(8) *Health Inspectors.* — There are nineteen of these officers. They are specially trained for public health work and belong to the subordinate public health service. They are employed in the districts of Ganjam (plains and agency) and Koraput. For public health work the districts have been divided into "ranges", and each range generally comprises a revenue taluk. Each health inspector is in charge of such a range and is regularly employed in carrying out public health work in the rural areas of his range under the general supervision of the health officer or the civil surgeon and agency surgeon, as the case may be. He is also trained in inoculation work and carries out anti-cholera inoculation and vaccination during epidemics. Definite duties have been prescribed for him by the Government.

(9) *Vaccinators.* — Their main duty is vaccination in rural areas, but in the off-season they attend to other duties, such as verification of vital statistics, etc. They are employed directly under the control of the health inspectors. Each health inspector has two or three vaccinators under him.

(10) *Inspectors of Vaccination.* — The duty of the inspector is to supervise the work of the sub-inspectors and vaccinators of the district.

(11) *Sub-Inspectors of Vaccination.* — They supervise and check the work of licensed vaccinators employed for the district.

It may be noted that, since the year 1933, the control of vaccination in the districts of Cuttack, Puri and Balasore of North Orissa has been transferred from the Government to the district boards, and the Government inspecting staff has been discharged in these districts since then. As these three districts have each a district health organisation scheme, the supervision and checking of vaccinators' work are done by the district board staff. As the Sambalpur district and Khondmals have no such organisation, the Government has to maintain its own staff for inspection work.

(12) *A Reserve Medical Officer of Health for Epidemics.* — In times of epidemics temporary doctors are appointed by the Government and detailed for duty to supplement the staff appointed by the local bodies.

Chemical Analyst. — At present, all chemical, bacteriological, pathological and medico-legal cases are being carried out for the province in the Bengal, Bihar and Madras laboratories. There is a proposal to establish a combined public health, bacteriological and pathological laboratory for this province. It is expected that this will be done very soon and all analytical work of the province, excepting medico-legal work, will be done in the province.

(b) *Public Health Staff maintained by Local Bodies.*

In addition to the above staff maintained by the Government, the district boards of Cuttack, Puri and Balasore have each appointed health staff consisting of a health officer, assistant

health officers, health inspectors and disinfectors, according to the scheme outlined by the Government in 1924. This staff has been distributed in rural areas, and definite circles have been fixed for them. Half of the cost of these organisations up to a maximum of Rs. 10,000 is met by Government contribution, besides a free supply of vaccine lymph, cholera vaccine, public health forms, etc. There are between fifty and sixty vaccinators appointed on the licensed system for six months in the year to carry out vaccination in each district.

Except in the agency areas of Ganjam and Koraput and partially "excluded" areas, such as Sambalpur district, the health organisations of the rural areas of all the other districts are under the control of the local bodies ; but a liaison is maintained between these local bodies and the Government through the civil surgeon of the district, who is, under the existing laws, the district sanitary officer ; except in Ganjam, where the district health officer is a provincial service officer and he is independent of the civil surgeon of the Ganjam district.

Under the Bihar and Orissa Local Self-government Act, the civil surgeon of the district is generally on the Sanitation Committee of the board as its President, which is vested with all powers of the board in connection with the public health and sanitation of the district.

An attempt has been made to employ separate staff for public health and medical work. This measure is no doubt expensive, and the alternative to combine both the duties in one man may be sound from an economical point of view ; but it has proved a failure in the past and will prove so in future unless properly and efficiently supervised. Nevertheless, co-operation between these two bodies of workers is essential. In fact, co-operation from the medical officer has been secured in times of severe epidemics in view of the fact that the public health staff employed by the local bodies and Government in normal times is too small for the vast rural area to be dealt with. The dispensary doctor in such cases takes preliminary measures on the outbreak of an epidemic until relieved by the health staff. It may be pointed out that the health organisation that exists in South Orissa, both in the plains and in the agency tracts, is better and more complete than what obtains in North Orissa.

Maternity and Child Welfare.

Practically nothing exists at present in the rural areas, except one at Balugaon, in the district of Puri, which was opened only four months ago by the enterprise of the local Government officials and the leading villagers.

It is hoped that, with the formation of a child welfare and maternity society for the province, this form of medical aid will be tackled for the rural area (Figure 11).

Budgets.

The anticipated total receipts from all sources which constitutes the income of the province is estimated at Rs. 1,92,45,616 and the estimated expenditure on public health is Rs. 2,24,944 during the year 1936/37.

The following table shows the income of the district boards and the expenditure on public health, including water supply, for the year 1935/36 :

Name of district	Gross income, excluding opening balance Rs.	Expenditure on public health Rs.	
Cuttack	6,89,684	34,364	
Puri	3,49,728	27,954	
Balasore	4,08,323	28,589	
Sambalpur	2,53,768	3,455	
Ganjam } (1936/37) {	5,22,080	1,07,710	{ Both medical and public health
Koraput } {	94,234	9,096	

There are no charitable funds in the province for public health work.

II. RURAL RECONSTRUCTION.

The local Government has just formulated a scheme called the village welfare scheme. The programme includes :

- (1) Improvement of public health (personal hygiene and village sanitation). — Improvement of the houses, roads and water supply. — Popularising vaccination. — Training of village dais. — Care of children. — Preventive measures against epidemics.

- (2) Spread of primary education. — Encouraging all children of school-going age to attend primary schools. — Provision of a night school for adults.
- (3) Improvement of agriculture. — Introduction of paying crops, better seeds, methods and implements. — Preservation and use of manure. — Growing of vegetables and fruits. — Irrigation facilities to be provided by joint labour. — Wells or tanks to be dug or improved. — Encouraging consolidation of holdings and discouraging fragmentation.
- (4) Veterinary. — Maintenance of a good breeding bull. — Cattle inoculation. — Prevention of epidemics. — Growing fodder crops.
- (5) Introduction of additional sources of income. — Poultry-breeding. — Tusser or Eri cocoon breeding. — Suitable cottage industries.
- (6) Establishing a grain gola or a co-operative credit society.
- (7) Improvement of social life in general. — Reading clubs or rooms. — Revival of indigenous sports. — Establishment of akharas for physical culture.
- (8) Settlement of village disputes, criminal as well as civil, except those involving cognisable offences.

This will be tried in three or four villages specially selected for the purpose.

Agricultural and industrial exhibitions are held from time to time at different places, in which various exhibits of public health interest are put up for demonstration.

Health Propaganda.

Since the inauguration of the public health organisation schemes in the districts, regular propaganda work on health matters by formal lectures, lantern demonstrations at industrial exhibitions, baby shows and baby weeks, lessons in schools, informal talks with villagers, publication of short articles through newspapers, distribution of leaflets and pamphlets by the district health staff and the Government public health

officer have been carried on to the remotest of the villages. As a result, it has helped to some extent to rouse public health consciousness amongst the people. The villager does not now so often fly away from the doctor when he comes for inoculation or vaccination. Two decades ago this was not the case. In some parts, people have begun to form societies for rural welfare work, such as clearing the village of rank vegetation, water hyacinth from tanks, making roads, etc. This propaganda work should be persistently carried on to achieve any permanently good result.

III. SANITATION AND SANITARY ENGINEERING.

Housing.

There is no law to enforce the construction of houses on approved plans, nor have any model plans for village houses been prepared and recommended for the purpose. The country houses are generally built with mud walls and thatched roofs.

Water Supply.

In the hot months, all sources of water supply dry up and scarcity of water is acute at this time. The district boards, with the aid of Government grants, have provided tube wells (Figures 12-14) and excavated tanks where there is scarcity and distress. But the number of such tube wells and tanks are few and far between considering the need of the people. The problem of drinking-water in flooded areas of North Orissa is a serious one, as the shallow wells in most instances do not yield potable water. In most parts of Balasore district, saline water, even in deep tube wells, is found. In times of epidemic, all those sources of water which are reserved for drinking purposes are protected by *choleraphage* or disinfectants.

Disposal of House Refuse and Other Wastes.

In villages, the habits of storing rubbish and cow-dung in the vicinity of residential houses make the villages a veritable source of nuisance and consequently they breed flies and spread



Figure II.

Midwife, Khurda Maternity Centre, advising mothers. (Puri District, Orissa.)



Figure 12.

Reserved tank for supply of water guarded by Boy Scouts and Chowkidars (Atri Mela). (Puri District, Orissa.)

During recent years no expenditure has been usually incurred either in the construction of new tanks or in repairing old ones; but most of the allotment under water supply is spent on sinking pucca masonry wells or tube wells.



Figure 13.
Tube well in Panchayat.



Figure 14.
A tube well in a village.



Figure 15.

Photo of the Members of Anti-malarial Society clearing jungles and kerosining the tanks. (Balasore District, Orissa.)

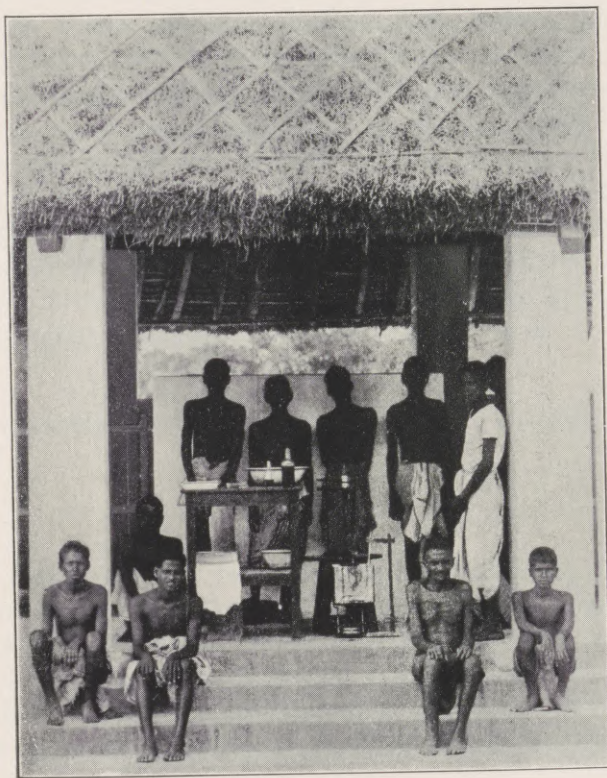


Figure 16.

Leprosy Clinic : Lepers waiting for injection.
Shed showing thatched roof. (Cuttack District, Orissa.)

diseases. Persistent propaganda and legislation can alone minimise this nuisance and, as far as possible, this is being attempted with notable results in South Orissa.

IV. NUTRITION.

No data is available which could be included in this report to be of any value. The staple food of the mass in rural areas is chiefly rice, dal and vegetable leaves. No experiment or investigation has been made with regard to the food value of the diet the people generally take. Nutritional diseases are, however, seen among the people. During the course of school medical inspection, children are often found suffering from angulo-stomatitis, due to vitamin B₂ deficiency, rickets, stunted growth and other nutritional diseases.

It is gratifying to note that it is proposed to hold a nutrition enquiry in rice-eating areas of Orissa during this cold season under Dr. Gurjel WILSON, and the information gathered by her, it is hoped, will be invaluable for the province.

Indiscriminate sale of adulterated and obnoxious articles of food in rural areas contributes to a great extent to several diseases due to the use of such articles of food. The Madras Prevention of Adulteration Act and the Bihar and Orissa Food Adulteration Act apply only to the urban areas of the province. They have not been extended to the rural areas. There is, therefore, no means at the hands of the public health workers in rural areas at present to check this nuisance.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL AREAS.

Malaria.

The major portion of the province, especially the agency tracts of South Orissa and the deltaic portions of Cuttack, Puri and Balasore districts, called the flooded areas, are heavily infected with malaria, recording a spleen rate of over 50%.

In Koraput district, anti-malarial measures are carried out in four important centres at the cost of the Government.

In Ganjam plains, anti-malarial measures are carried out conjointly by the Bengal Nagpur Railway, the district board and Panchayat board of Chatrapur in the Panchayat Board area and the Humma Salt Factory area.

In the districts of Cuttack, Puri and Balasore, a systematic campaign against water hyacinth is carried on through the revenue officials of the districts.

Anti-malarial measures in the district of Puri, along the foreshore of the Chilka Lake, which is a most heavily infected area of the district, are carried out conjointly by the Government and the district board by removing the rank vegetations and also by quino-plasmochin treatment of villagers.

The Bengal Nagpur Railway authorities also carry out anti-malarial measures along the railway-line in their colonies and the adjoining paddy fields with paris green. In certain parts this is being objected to by the cultivators, as they hold that paris green is harmful to the paddy crop. Paris green experiments are being carried on by the Government Public Health Department in collaboration with the Agricultural Department of the province to see the effect of paris green on paddy crops.

Besides the usual treatment with quinine of patients at outlying dispensaries in rural areas, free distribution of quinine is made both by the Government and the local bodies in heavily infected areas.

The question of the appointment of a malaria officer for the province is now under the consideration of the local Government, and it is hoped that anti-malarial organisations will be started with the help of this officer when appointed.

In spite of their desire to take effective measures against malaria, the local bodies as well as the Government, particularly in North Orissa, are handicapped for want of proper legislation to prevent excavations and to take other measures for the control of man-made malaria.

Plague.

This disease is non-existent in this province.

Ankylostomiasis.

This disease is, fortunately, not a very serious problem in North Orissa. In North Orissa, except in the union committees and union boards areas, no arrangement for conservancy has been made in the rural areas. In South Orissa, previous to 1933, a unit was working in the district of Ganjam to carry on propaganda work and for examination and treatment of patients and for advising the local bodies to construct cheap bore-hole latrines for the prevention of soil pollution. As a result of the activity of this unit, some bore-hole latrines were put up in some panchayat boards like Aska, Russelkonda and Gopalpur and they are still working. In other Panchayat boards, pucca type design open-sand latrines are put up for the use of the public.

Tuberculosis.

Tuberculosis is not very common in the province. No special measures have been taken so far for the rural areas.

Pneumonia.

This disease is not a menacing problem in Orissa.

Yaws.

This is prevalent in Koraput district in certain circumscribed areas. There is evidence to show that the disease is widely prevalent in Malkanagiri Taluk of that district.

Leprosy.

The incidence of leprosy in Orissa is high and widespread throughout the province, especially in the districts of Puri and Ganjam. In the parts where the disease is most prevalent the statistical figures show that 2 to 3% of the population is infected with this disease. Leprosy is really a menacing problem in Orissa. A correct census of lepers has not been taken. There is an asylum at Cuttack with accommodation available for 300 patients. It is run through missionary effort, but the Government makes a capitation grant of Rs.3 for each leper.

There is also a leper colony at Puri with provision for seventy beds. It is maintained by Government. In addition, leprosy clinics have been opened in almost all the districts of the province and their total number is about sixty (Figure 16).

A scheme is now under the consideration of the Government for the appointment of a leprosy officer for the province and to organise district leprosy committees under the provincial branch of the British Empire Leprosy Relief Association, which will shortly be inaugurated.

Mental Diseases and Drug Addiction.

In North Orissa, especially in the district of Balasore, the habit of taking opium and the use of bhang (*Cannabis indica*) in the Puri district is very prevalent. Even the labouring class of women give a small dose of opium to their babies to make them sleep so that they can work in the fields without being disturbed by them.

Propaganda work by the health staff is being done to bring home to the people the injurious effect of this habit. But any marked mental derangement of people due to drug addiction has not been observed. There is no mental hospital in this province and a few declared cases of insanity are sent to the Indian Mental Hospital, Kanke, Ranchi, in Bihar. But it may be pointed out that the general stupor and poor physical development of the people particularly noted in the northern part of Balasore district are generally attributed to the habit of taking too much opium by a large number of inhabitants. The prevalent idea there is that this helps to ward off malaria, Balasore district being notorious for this disease.

Smallpox.

Vaccination is compulsory only in the municipalities, the rural areas of Puri district and the Ganjam plains ; in the latter place, re-vaccination is also compulsory. In the rest of the province it is optional, and vaccination is done by persuasion, education and propaganda.

In North Orissa, vaccination was under the control of Government until 1933, and since then it has been transferred

to the control of the district boards, except the district of Sambalpur, where it is still under Government control. Vaccination in the rural areas is performed by licensed vaccinators, who charge a fee of 2 annas per operation and appropriate it to themselves. In the district of Puri, where primary vaccination is compulsory, it is performed at the vaccination depots free of cost.

The vaccinator visits the thana and takes down the primary cases from the village birth register, and, thus supplied with the information, he visits village after village for vaccination.

As vaccination is not free, the poor people who are also illiterate evade vaccination, as they think they cannot afford to pay the vaccinator's small fee. The recording of vital statistics in rural areas, except in the Ganjam plains, is not compulsory, so all births are not recorded. Therefore, a large percentage of primary cases go unprotected.

In the agency area of South Orissa, as well as in the Ganjam plains, vaccination is performed free of charge. It is proposed to make vaccination compulsory throughout the province and, unless this is done, it will be difficult to control smallpox, which appears in large epidemic waves at regular periodic intervals. Vaccine lymph is supplied free by Government.

Cholera.

Cholera is prevalent in the rural areas of the province almost throughout the year. It is endemic in most parts of the rural areas in North Orissa. On the outbreak of cholera in any village, the village headman in South Orissa and the police in North Orissa send reports to the nearest health inspector, who, immediately on receipt of the information, visits the village and takes the necessary measures, which include disinfection of houses and contacts, chlorination of water supplies, mass inoculations with anti-cholera vaccine and propaganda. Cholera bacteriophage is also used as a preventive and curative measure. In times of severe epidemics, the rural dispensary doctors are employed in epidemic duty within a radius of five miles, and additional hands are appointed both by the Government and the local bodies.

Cholera vaccine and bacteriophage are supplied by Government free of cost.

CONCLUSION.

The whole country, except the comparatively small parts of the agency tracts, the Ganjam plains and Sambalpur district, is flat and low-lying. The vast flat portions and low-lying areas are open to inundation and flood and, therefore, proper drainage of the countryside itself is a difficult problem. Innumerable rivers, the largest among them the Mahanadi and its distributaries, and the various watercourses and canals, tanks and excavations made at the time of removing earth for house construction and buildings all contribute towards the water-logging of the country. The major portion of Cuttack and Puri and practically the whole of Balasore district are notorious for this. Geographically, therefore, the major part of the province is poorly situated. Lack of communication bridges and roads favours the prevalence of epidemics in the country area, as the public health staff cannot move fast to the scene of occurrence.

With the development of the small and new province as a separate entity, it is hoped to improve the general organisation of public health and medical relief at a comparatively quick pace.

21. NOTES ON MEDICAL AND PUBLIC HEALTH ORGANISATIONS IN THE PUNJAB.

Area : 99,200 square miles.
Population : 23,580,852.
Districts : 29.

A. MEDICAL ORGANISATION IN THE PUNJAB, by

Colonel C. H. REINHOLD, I.M.S., Inspector-General of Civil Hospitals,
Punjab.

MEDICAL DEPARTMENT.

This department controls medical education, the Chemical Examiner's Department, the Punjab Mental Hospital and the curative side of medicine. The head of the department is the

Inspector-General of Civil Hospitals, an officer of the Indian Medical Service (I.M.S.) with the rank of Colonel. He is assisted by an Assistant Inspector-General, an officer of the Provincial Civil Medical Service or of the Indian Medical Department.

On the education side, the Inspector-General of Civil Hospitals controls the King Edward Medical College, Lahore, which trains students for university medical degrees, and the Medical School, Amritsar, which trains students for faculty qualifications and where, also, dispensers and dressers receive a training. The deMontmorency College of Dentistry trains students for the B.D.S. degree and L.D.S. diploma and provides a post-graduate course in dentistry for both medical graduates and medical licentiates. The Inspector-General of Civil Hospitals is the controlling authority for grants-in-aid to the State-aided institutions which assist in medical education; chief of which is a Women's Medical College in Ludhiana, staffed by missionary effort, from which licentiate women doctors, on an average nineteen, qualify every year. He is President of (i) the Punjab Medical Council, a provincial body analogous to the General Medical Council of Great Britain, (ii) the Punjab State Medical Faculty, a body which grants the faculty qualifications recognised by the Punjab Medical Council, and (iii) the Punjab Nurses' Registration Council, a body which controls the registration of qualified nurses, health visitors, nurse-dais and dais.

The Chemical Examiner's Department is under the control of an I.M.S. officer with the necessary qualifications.

The Punjab Mental Hospital, Lahore, which is under the control of an I.M.S. officer, provides accommodation for 1,008 patients—826 males and 182 females. Besides the Punjab, mental patients from the Indian States in the Punjab, North-West Frontier, Baluchistan and Delhi Provinces and Kashmir State are admitted to the hospital.

On the curative side, the Medical Department is a hospital organisation. The number of hospitals and dispensaries located in rural areas is 686. The medical personnel employed in the province consists of 3,061 members, of which 2,878, or 94%, are employed in rural areas. The hospitals situated in urban areas primarily serve the urban population in the outdoor

department, but the majority of indoor patients come from the rural areas and may be estimated as between 60% and 70%.

The Mayo Hospital, Lahore, to which is attached the King Edward Medical College, serves as a model for the whole province, and difficult and complicated cases, not only from the province, but also from the adjoining provinces, the Indian States and from Afghanistan, seek admission to its wards.

A tuberculosis institute—Rai Bahadur Amar Nath Tuberculosis Institute—has recently been added to the Mayo Hospital. It is a self-contained hospital for the treatment of patients suffering from tuberculosis. The institute provides accommodation for fifty-one patients with an out-patients' department and a separate dispensary. It fills three objects: (1) the teaching of students, (2) the treatment of tuberculosis cases, and (3) instruction in prophylaxis which is the basis of subsequent propaganda.

Midwifery training is carried out in a separate hospital—the Lady Willingdon Hospital for Women, with seventy-four beds and approximately 519 patients per annum available for students.

The training of nurses and dais is mainly effected in a purdah hospital—the Lady Aitchison—entirely staffed by women, where approximately 565 confinements are attended annually.

The majority of the doctors in the province are licentiates, chiefly employed in rural areas, who have a four-year course and are trained at medical schools in Amritsar for men and a few women students, and Ludhiana for women only, and of these approximately sixty-seven men and twenty-one women qualify annually.

A Government Dental Hospital was opened in 1930 in Lahore, the first of its kind in India built and equipped with all modern appliances, including a dental X-ray plant, and which rapidly achieved sufficient popularity to justify the addition of a teaching unit, “the deMontmorency Dental College”, in 1934. Here at first post-graduate students were trained and passed preliminary and final examinations. Graduates after two years received the degree of B.D.S. and licentiates after eighteen months a diploma of L.D.S. In 1936, a whole-time four-year

purely dental degree course was approved by the Medical Faculty of the Punjab University for the B.D.S., and a shorter L.D.S. course is under contemplation with the Punjab State Medical Faculty.

For each *district* there is an administrative medical officer—viz., the Civil Surgeon—who is in immediate charge of the district headquarters hospital, administratively controls all the hospitals in the district, including Tahsil headquarters hospitals, and rural dispensaries, nearly all of which have some indoor accommodation. The total indoor accommodation of all hospitals and dispensaries is 11,340 beds, which represent 0.48 bed per mille of population of the province (which is 23,580,852). The charge of the more important of them is held by assistant surgeons (graduate class) and the smaller dispensaries are served by sub-assistant surgeons (licentiate class). All hospitals and dispensaries, whether they have bed accommodation or not, are organised on a hospital basis, the medical staff being constantly on duty and not expected to leave the dispensaries except in cases of emergency. The urban areas are fully served and, in the case of rural areas, the Government has opened 360 rural dispensaries, providing one dispensary for the mean of 30,000 population and 100 square miles. These dispensaries are maintained by district boards, with a grant-in-aid annually paid by the Government towards their maintenance.

The total number of in-patients treated in the State, public, local fund and private aided dispensaries in the Punjab during the year 1935 was 212,860, of whom 106,842 were men, 80,802 women and 25,216 children. The total number of out-patients treated in all hospitals and dispensaries during the year 1935 was 13,646,068 (5,729,650 men, 3,217,970 women and 4,698,448 children). The number of surgical operations performed in all hospitals and dispensaries during the year 1935 was 592,442, of which 73,738 were selected operations.

Of the various diseases for which in- and out-patients were treated in all classes of hospitals and dispensaries during the year 1935, *diseases of the eye* accounted for the largest number of patients treated—i.e., 22.45% of the total attendance in hospitals. This is due to the fact that ophthalmic surgery has

become a special feature of the Punjab in the past forty years and several centres of more than provincial reputation have grown up and attract large numbers of patients. The total number of patients treated in 1935 for eye diseases was 3,411,479.

Next to diseases of the eye, *malaria* was the most common disease treated in hospitals. The total number of patients treated during the year 1935 was 1,846,147, from which sixty-eight deaths occurred in hospitals. These figures cannot, however, be considered a real index of the mortality, as patients suffering from malaria are not generally admitted to hospitals. The majority of them treated in the outdoor department are comparatively mild cases. A large number of severe cases do not reach hospital at all, and it is doubtful whether any quinine reaches them in their homes.

Smallpox was higher in 1935 than in 1934. There were 789 cases treated in the year 1935 as against 343 in the previous year.

The number of patients treated for *tuberculosis of the lungs* was larger than in the previous year—viz., 32,451 in 1935 and 32,077 in 1934—and continues to increase, partly due to more accurate diagnosis.

Pneumonia claimed the heaviest toll in proportion to the number of patients treated in hospitals and dispensaries. In all 41,798 patients with 582 deaths were treated in 1935, as against 54,840 with 837 deaths in 1934. The large number of deaths from this disease is due to the fact that patients are only brought to the hospital when in a critical condition.

In Simla, the mortality was about 50% among hill coolies due to cardiac failure, the result of heart strain from carrying heavy loads.

The total number of patients treated for *dysentery* was 184,981, as compared with 207,523 in 1934.

Leper Homes.

There are five leper homes and fifty-two leper clinics working at present in the province. During the year 1935, 637 cases were treated in the five leper homes at Palampur, Sabathu, Tarn Taran, Rawalpindi and Ambala. Of these, 125 patients

were relatively cured, 139 were returned as much improved and 205 improved. The condition of 92 patients remained unchanged, 12 got worse, 25 died and 82 left the homes. There were 578 cases treated in the outdoor clinics. Much useful work is being done by the provincial branch of the British Empire Leprosy Relief Association in combating the disease by carrying out leprosy surveys, propaganda work, opening of new treatment centres and training of doctors in anti-leprosy work, with the active co-operation of the Public Health and Medical Departments. There is a great awakening of interest in the more recent methods of treatment, and lepers have now begun to feel that the disease is curable and that they can look forward to the prospect of a return to normal life.

A grant of Rs. 59,000 was made by the Government towards the maintenance of the five leper homes referred to above.

Medical Inspection of School-children.

For many years the Education and Medical Departments have been making earnest endeavours to deal with the problem of medical inspection and treatment of school-children. The objects in view have been :

- (i) To provide for the systematic medical examination of school-children throughout their school life ;
- (ii) To follow up and keep under supervision all children found to be suffering from any disease ;
- (iii) To provide appropriate treatment for them ; and
- (iv) To secure as far as possible healthy growth and development and the prevention of sickness among school-children.

Various schemes were introduced in 1915 and 1926, but experience of their working revealed certain defects. The following modified scheme was introduced in the year 1933 and tried in the five districts of Gurgaon, Jullundur, Shahpur, Multan and Sialkot :

- (i) The work of medical inspection to be carried out entirely by the Medical Department ;

(ii) Only those schools which are within a two-mile radius of a dispensary come under the scheme ;

(iii) The scheme is applicable to the rural areas only of the districts concerned and not to urban areas.

Under the above scheme, medical officers are entitled to a remuneration of Rs. 8 per 100 boys examined, and the expenditure is met by Government in the Education Department. Medical officers in charge of all rural dispensaries in the province are responsible for medical inspection and treatment of school-children enrolled in the schools of the villages where these dispensaries are located. The above scheme is working satisfactorily in four out of five districts and it is proposed to extend it.

A self-supporting scheme has been evolved in urban areas which need not be dilated upon in this communication.

Female Medical Aid.

Arrangements exist at almost all the State public and local fund institutions for the examination and treatment of women patients apart from male patients. This is, however, not sufficient, as purdah women hesitate to be treated by male doctors not only for diseases peculiar to women but also for general ailments. It is therefore necessary to proceed further with the scheme which was inaugurated by the Government in 1926 for the provision of medical aid for women by lady doctors and which is being held in abeyance at present owing to financial stringency. The scheme contemplated the establishment of a separate women's hospital at the headquarters of each district under the charge of a woman assistant surgeon, the appointment of a woman sub-assistant surgeon in charge of the female section at each tehsil headquarters hospital and the appointment of a nurse-dai or trained dai to every other hospital or rural dispensary.

A 12½ % cut was imposed on the grants-in-aid paid to district boards for the maintenance of rural dispensaries owing to financial stringency. Recently, the Government has agreed to restore the cut on the condition that the district boards

employ a nurse-dai at each rural dispensary in the Punjab out of the sum restored.

There are at present fifty separate hospitals for women under the charge of medical women, of which five are maintained by Government, nineteen by local bodies, twenty-three by mission authorities, one by the Lady Hailey Women's Hospital Trust at Bhiwani, one by the Lady Reading Women's Hospital Fund in Simla and one by Rai Bahadur Benrarsi Das in Ambala Cantonment. In addition to separate hospitals for women, thirty-three women doctors are in charge of female sections in general hospitals—nineteen maintained by Government, thirteen by local bodies and one by the Red Cross Society at Campbellpur.

Anti-rabic Treatment.

Previously, anti-rabic treatment was only available at the Pasteur Institute of India, Kasauli, and patients from all parts of the Punjab had to proceed there. With the simplification of the treatment, the work has been gradually decentralised. In the first instance, a centre was established at the Provincial Bacteriological Laboratory at Lahore. This centre proved a great success. Since the year 1934, centres have been opened at each district headquarters hospital in the province, increasing the total number of anti-rabic centres from one (Kasauli) to thirty. It is now contemplated to open centres at each teshil headquarters hospital. The district centres draw a large number of patients from the rural areas, and only the severest cases are now sent to Kasauli. As a result of this experiment, there has been no appreciable increase in the mortality from rabies.

Prevention of Blindness.

The local Government has, at the instance of the Government of India, appointed an advisory committee to consider measures for the prevention of blindness in the province. The committee consists of the following: the Inspector-General of Civil Hospitals, Punjab, President; the Director of Public Instruction, Punjab, the Director of Public Health, Punjab, the Commissioner, Rural Reconstruction, Punjab, Professor of Ophthal-

mology, King Edward Medical College, Lahore, officials ; three private eye surgeons ; two members of the Provincial Legislative Council ; the Organising Secretary, Indian Red Cross Society, Punjab Branch.

The work of this committee is limited to propaganda by pamphlets and posters in the vernacular.

B. PUBLIC HEALTH ORGANISATION IN THE PUNJAB WITH SPECIAL REFERENCE TO RURAL AREAS

by

Lieut.-Colonel C. M. NICOL, I.M.S., Director of Public Health, Punjab.

I. HEALTH AND MEDICAL SERVICES.

There are two departments of Government dealing with Health—Medical and Public Health.

These two departments, each of which is an independent, self-contained unit with its own departmental head, are controlled by the Ministry of Education, the channel of communication between the head of the department and the Ministry being a lay secretary, an officer of the Indian Civil Service, officially designated as “Secretary, Transferred Departments”.

Public Health Department.

The Public Health Department is controlled by the Director of Public Health, an officer who is directly responsible to the Ministry.

Personnel.

The personnel of the department, in addition to the Director, are :

(1) Public health staff :

Assistant Directors of Public Health	4
District medical officers of health	28
Nutrition survey officer	1

Medical officer of health (factories) and statistical officer	I
Public health chemist	I
Provincial leprosy officer	I
Superintendent, Public Health Equipment Depot . . .	I
Sub-assistant health officers	10
Sanitary Inspectors	43
Dispensers	28
Photographer	I
Draftsman	I

Staff of Epidemiological Bureau :

Epidemiologist	I
Assistant epidemiologists	2
Attached medical officer	I

Staff of Punjab Vaccine Institute :

One of the Assistant Directors of Public Health is in charge.
I superintendent.

Staff of Punjab Health School :

- I Lady Principal, who is also inspectress of maternity and child welfare centres.
- I lady superintendent.
- I assistant superintendent.
- I assistant inspectress.

Additional staff is employed temporarily during epidemics or other emergency—*e.g.*, during an outbreak of cholera in 1936 six sub-assistant health officers and eight sanitary inspectors were employed for periods of from three to six months.

(2) Engineering Staff :

- I superintending engineer
 - 2 executive engineers
 - 4 sub-divisional officers
- and the necessary subordinate staff.

These are P.W.D. officers under the administrative control of the Chief Engineer, P.W.D. They carry out all public health engineering projects, which in rural areas consist solely of water-supply schemes.

Staff auxiliary to the regular Public Health Department personnel exists in the form of health visitors in charge of maternity and child welfare centres in rural areas. These visitors, whose duty it is to train indigenous dais (midwives) in proper methods of ante-natal, midwifery and post-natal work, are employed by voluntary organisations, such as the

Red Cross Society, who make themselves responsible for a number of maternity and child welfare centres in rural areas. There are forty-eight of these rural centres with 111 sub-centres in the province.

At the end of 1935, there were 1,758 dais under training at the various centres, in addition to 906 who had by that time completed their training and obtained certificates of proficiency.

In addition, a limited amount of work auxiliary to the Public Health Department is performed by medical officers in charge of rural dispensaries, who are under the Medical as distinct from the Public Health Department. These officers in emergency take measures for the control of outbreaks of cholera should the public health staff not reach the scene of the outbreak first.

The above constitute the provincial cadre, which is distinct from subordinate public health staff employed by local bodies in districts. The provincial staff is paid for by Government, the local subordinate staff by local authorities.

Technical Work located at Provincial Headquarters.

There are certain central organisations which, in addition to the office of Director of Public Health, are situated at headquarters. These are :

- (1) The Punjab Vaccine Institute, which prepares and distributes vaccine lymph ;
- (2) The Epidemiological Bureau, which includes a bacteriological laboratory and propaganda organisation ;
- (3) The Punjab Health School, which is an organisation for the training of health visitors.
- (4) The Public Health Chemical Laboratory for the examination of water and food.

Other activities carried on at headquarters are the training of sanitary inspectors and vaccinators.

Organisation.

For the purposes of public health administration, the province is divided into three ranges, each of which is under the immediate control of an Assistant Director. The fourth Assistant Director

is in charge of the Vaccine Institute. Each range consists of a number of districts, of which there are twenty-nine in the province. Each district is under the control of a district medical officer of health.

The district organisation is the essential public health unit throughout the province in so far as rural sanitation is concerned. The district medical officer has under him subordinate personnel consisting of ten to twenty-five trained vaccinators and superintendents of vaccination paid for by the local authority, one to three sanitary inspectors from the provincial cadre and, where special conditions demand, a sub-assistant health officer also belonging to the provincial cadre. Special plague staff is employed by some local bodies, on a permanent basis in some cases, in others temporarily, as occasion requires.

A provincially paid dispenser is attached to each district medical officer of health.

The Activities of the District Public Health Staff.

These are :

- (1) The control of epidemic and infectious disease ;
- (2) The systematic carrying out of vaccination ;
- (3) The carrying on of propaganda work in connection with sanitation and hygiene amongst villagers and the initiation and control of sanitary work in villages ;
- (4) The carrying out and control of sanitary arrangements for large rural fairs ;
- (5) The supervision of maternity and child welfare work ;
- (6) The sanitary inspection of small towns, factories, mines and schools where these are not under the control of a municipal health officer.

The vaccination staff ordinarily work for five months in the year at vaccination. During the remainder of the year they are available for other work, mainly village sanitation, the checking of entries in birth and death registers, and coping with any outbreak of epidemic disease which may occur.

The denomination of the district medical officer of health's staff is rather misleading ; it is a relic of the past really. The

vaccinators, as indicated, do much work other than vaccination ; the plague staff, where it exists, does general sanitary work in villages in addition to its primary duties, and “ dispensing ” is the least part of the so-called dispenser’s work ; he is really a “ handy-man ” attached to the district medical officer of health, the necessity for dispensing by the public health staff has almost ceased since rural dispensaries under the Medical Department were introduced.

An average district in the Punjab has an extent of approximately 4,000 square miles and contains approximately 800,000 inhabitants living in approximately 1,600 villages. It should be understood, however, that many villages contain 500 or fewer inhabitants and some have as many as 6,000 and are virtually small towns in all but name.

It can be appreciated, therefore, that the control which a district medical officer can exercise in his area is exceedingly limited.

The only Public Health Law which the district medical officer of health has to support him is contained in the District Board Act and is adoptive. In many cases where Public Health Regulations are adopted, they are not enforced by local authorities, who alone have the powers to enforce. A district medical officer of health must depend very largely on his own initiative and personality in order to get sanitary and preventive work carried out.

As indicated above, the medical and public health services are separate and distinct and are under separate control. The heads of these departments are, however, both consulted by Government on medical and health matters when it is considered necessary to obtain a double opinion ; in this sense, liaison and collaboration are good at headquarters.

It cannot be said that the same degree of collaboration exists between these two services in the actual rural areas. District medical officers of health have the right to inspect rural dispensaries, and do, in fact, inspect them from time to time. On the other hand, as indicated above, the dispensary doctor may in emergency take control of operations to check an outbreak of cholera until the district medical officer of health arrives ; but, in general, they follow separate and distinct paths.

The Medical Department, as the older service, still carries out a number of functions which should logically belong to the Public Health Department—*e.g.*, the collection of vital statistics and the inspection of school-children.

There are 366 rural dispensaries throughout the province which are under the Medical Department. The officers in charge of these carry out no work for the Public Health Department with the exception of the emergency duty already indicated.

The limitations imposed on both Medical and Public Health Departments by this relative divorcement of their respective personnel has become apparent and Government is now considering the question of *handing over rural dispensaries to the Public Health Department*, so that curative and preventive medicine may go hand in hand.

Decentralisation to a greater extent than exists at present must depend on the handing over of these dispensaries so that they may provide a local footing for the Health Department in each area of a district. A plan for the achievement of this has been worked out, the object of which is to have a local health authority controlling a local health area consisting of a group of approximately fifty villages with a population of approximately 30,000. The rural dispensary would be the centre for health activity as well as medical activity and the dispensary doctor the local health officer.

The question of making the Public Health Department responsible for the collection of statistics and for examination of school-children is also under consideration.

Budgets.

The average annual amount spent by the provincial Government on public health over the last ten years is Rs. 15,26,000.

This figure includes the pay of the public health staff proper, of the engineering staff, the upkeep of the Vaccine Institute, Punjab Health School and Epidemiological Bureau, and the offices of the Director and Assistant Directors.

A sum averaging Rs. 3 lakhs approximately per annum is spent on public health works, such as water supplies and drainage systems.

Of the total, approximately 13 lakhs are spent on activities directly benefiting the rural population, which numbered approximately 20 millions at the last census. This means that expenditure on public health by the provincial Government is 1 anna per head per annum of the rural population.

Local bodies spend on the average Rs. 6 lakhs per annum on public health work. This means $\frac{1}{2}$ anna per head per annum for rural population, so that the total expenditure is $1\frac{1}{2}$ annas per head per annum.

For the past two years Government of India grants have been given for rural uplift work. The Public Health Department has received, or is likely to receive, sums totalling approximately 5 lakhs from this source, to be spent over a period of five years.

The British Empire Leprosy Relief Association spend, on an average, approximately Rs. 12,000 per annum on leprosy work throughout the province. An additional Rs. 3,000 from the Victoria Memorial Fund is devoted to maternity and child welfare work.

During the last one or two years in certain localities villagers themselves have shown sufficient interest in public health work to contribute voluntarily towards the carrying out of drainage, paving of streets and improvement of wells. The sums, in actual money, may be small, but frequently the equivalent of a money contribution is given in labour or material.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

In the Punjab up to date there has been no question of compelling villagers to adopt personal or environmental hygiene. There is, in fact, evidence to show that a great deal can be done by persuasion alone and that when a sense of rivalry is developed good progress can be made. A great drawback to progress is the lack of efficient teaching of hygiene to children in village schools and the entire lack of a hygienic background on which they may practise the little that has already been taught. In rural schools, no latrines, urinals or wash-basins with soap and towel exist.

There can be no question but that the illiterate state of the vast majority of women in rural areas is responsible for retarding progress in hygiene. The advent of the health visitor and the organisation of female education give hopes of altering this state of affairs.

Co-ordination in the various activities (agricultural, educational, health and so on) carried on under the general term "rural reconstruction" is obtained through the provincial commissioner for rural reconstruction in association with deputy commissioners in charge of districts. In each district there is a rural community council on which, in addition to lay members, each Government department is represented by its local head. This council interests itself in and promotes by advice, and occasionally by grants of money, all measures calculated to improve rural conditions. When this body is really active, it serves a very useful purpose.

There can be no doubt that a great deal of propaganda work goes to waste. The difficulty is to combine practical demonstration with precept. Where this can be done—*e.g.*, where neighbouring villagers are brought to see drains and street-paving in a village in which work of this description has been carried out—they appreciate the benefits of such improvements and are as a rule willing, and sometimes even eager, to reproduce what they have seen in their own villages.

III. SANITATION AND SANITARY ENGINEERING.

Housing.

It is realised that radical reform in housing must depend on better economic conditions—that is to say, if houses providing the cubic space per head which is considered necessary in European countries be envisaged, together with domestic and hygienic amenities, such as kitchens, stores for foodstuffs, domestic latrines and so on, with the entire separation of accommodation for live-stock and human beings.

Nevertheless, the village house, as it has been elaborated by experience throughout centuries, is within its limitations admirably suited to an area where extremes of heat and cold

are experienced and where for nine months of the year the inhabitants live and sleep in the open. The defects in village houses are obvious ; many are now being remedied—e.g., there are few villages in the Punjab in which some of the houses at least have not been efficiently ventilated, and many in which all have had added to them the means of admission of light and air. Fire-places and chimneys have been built in many houses.

In canal colony areas, where villages have developed under the control of colonisation officers, the layout of villages is according to an approved standard and, although the villager is allowed considerable latitude as regards the design and size of his individual house, he is guided in avoiding glaring hygienic defects.

Drinking-water Supplies.

Drinking-water supplies are mainly obtained from the subsoil by means of shallow wells from which water is drawn by pulley, rope and bucket. Wells are gradually being improved by the provision of parapet walls, platforms and drains to convey away spilt water. Handpumps are in many areas replacing wells, and contrivances such as Persian wheels are taking the place of the pulley, rope and bucket. The bringing of an adequate and safe water supply to areas where no potable water is obtainable locally is extremely expensive and must devolve mainly on the provincial Government. Where the basic essential of a water supply is lacking, villagers are far too much preoccupied with this fundamental need to take any interest in “uplift” work. This, more than any other item of reconstruction work, is a primary necessity.

When a district board decides to provide a village or group of villages with a water supply, the services of the public health engineering staff are available on payment of fees fixed by Government. The scheme, when drawn up, is submitted to a standing sanitary board composed of lay and technical members with the Minister of Education as president, the Director of Public Health as secretary and the Superintending Engineer, Public Health Circle, as a member. This board recommends approved schemes for financing wholly or in part

by means of a grant-in-aid from Government. Ordinarily, 50% to 75% of the cost is met by Government.

In recent years, Government has set aside Rs. 50,000 per annum for the financing of rural water-supply schemes.

In addition, grants for the provision of a water supply at the sites of the more important rural fairs have been made by Government from time to time. In recent years, these sums have totalled approximately Rs. 4,00,000.

Disposal of House Refuse and Other Wastes and Campaign against Flies.

The disposal of refuse and waste matter is mainly effected by pitting outside the inhabited part of the village area. Personal hygiene and the disposal of waste matter have not yet reached such a standard that fly-breeding can be controlled. It is with the utmost difficulty that villagers can be made to use latrines of any description. They simply take to the fields. Thousands of bore-hole latrines were constructed in one district of the province at an expense of Rs. 8,000 with the more immediate object of controlling the spread of hookworm disease. Approximately 6 to 7% of these latrines were actually used even after a complete explanation as to their object had been given and a certain amount of control could be exercised.

IV. NUTRITION.

The state of nutrition of a people must ultimately be judged by their stature and general physical qualities. There are more Punjabees in the Indian Army than men of any other province. It would seem that there is nothing radically wrong with the villager's diet when his economic condition allows him a sufficient quantity of food. No doubt diet can be improved and, in certain limited areas, is obviously defective, but on the whole there is no crying deficiency in quality or quantity. The chief defect in Punjabee diet is a lack of fresh fruit and vegetables. A nutrition survey officer has been appointed and more exact knowledge regarding diet will be forthcoming in a few years' time.

Deficiency disease is rarely met with in the Punjab, except in certain limited areas—*e.g.*, the Kangra Valley, where late rickets and osteomalacia are very prevalent. The people in this area are extremely poor and admittedly their food is defective in those qualities the lack of which leads to these prevalent disabilities.

V. MEASURES FOR COMBATING CERTAIN DISEASES.

Malaria.

There is no specific self-contained anti-malaria organisation maintained by the Punjab Government. Work in connection with malaria throughout the rural areas of the province is carried on mainly through two agencies :

- (1) The Punjab Epidemiological Bureau ;
- (2) The district medical officers of health.

(1) The activities of the Epidemiological Bureau (as far as malaria is concerned) are as follows :

(a) The collection of data for, and the preparation of, the annual *malaria forecasts*. A preliminary forecast is issued on September 1st, the final on September 15th. In this connection, a bi-annual spleen census of school-children is carried out in June and November by civil surgeons and medical officers in charge of ten to twelve dispensaries in each district of the province.

(b) From time to time officers of the Bureau undertake malaria surveys in areas regarding which information is required for some special purpose. During the last seven years, 103 such surveys have been carried out.

(c) The examination of blood films sent in by the district medical officers of health and others. This may be for purposes of diagnosis in individual cases or for the estimation of the parasite rate of the inhabitant of a particular area. An average of 800 slides per annum are examined.

(d) The identification of mosquitoes sent in by district medical officers of health and others.

Approximately 500 specimens are received per annum.

(2) District medical officers of health undertake a limited amount of anti-malaria work (oiling, etc.) in their areas, according to the amount of money granted by local bodies for "work in connection with epidemic diseases", only a proportion of which is spent on anti-malaria work and that mainly on quinine.¹

In the course of general sanitary work carried out in villages, depressions likely to develop into mosquito-breeding grounds during the rains are filled in. Returns show much work of this nature as having been done.

A great deal of anti-malaria propaganda work is carried out by district medical officers of health by means of posters, leaflets and magic-lantern and cinema shows.

Anti-malaria Schemes in force.

Free quinine distribution is carried out annually through the agency of schools, police-stations, village lumberdars, etc., under the control of district medical officers of health. In the ten years 1925-1935, quinine valued at Rs. 4,12,363 was distributed, in addition to the quinine given in treatment from dispensaries and hospitals.

There is a reserve of 1,000 lb. of quinine in stock for free distribution should an emergency occasion demand.

In 1934/35, an attempt was made to provide the villager with reliable quinine by offering what was called "Taptor" quinine for sale. The undertaking was not a success and has been abandoned.

A cheap mosquito-net (Rs. 1-8 annas) has been made available for villagers by the Co-operative Department.

The following engineering work primarily designed for anti-malaria purposes has been undertaken—viz., canalisation and improvement to the bed of the River Leh at Rawalpindi, at an estimated cost of Rs. 87,376; the work is in hand now.

¹ Quinine and cinchona febrifuge issued free or sold in the Punjab during the year 1935 (average, non epidemic year) :

Issued	lb.	oz.	dr.	Issued per head of population. grain
Quinine	943	12	4	0.28
Cinchona febrifuge	416	4	11	0.12

Most of the work carried out by the Waterlogging Board, although in the first instance undertaken with a view to reclaiming land for agricultural purposes, has a definite value from the anti-malaria point of view. The cost of works carried out by the board has totalled over one crore and seven lakhs of rupees during a period of twelve years up to 1935. The chief works are :

- (1) Richna drain extension (Lower Jhelum Canal) ;
- (2) Upper Budhi Nalla (Upper Jhelum Canal) ;
- (3) Lower Raniwah scheme (Lower Jhelum Canal).

These works are still in progress.

Hookworm.

It is only during the last three years that anything approaching an accurate idea of the prevalence of hookworm disease has been obtained in the Punjab. During these three years a systematic survey of fifteen districts has been carried out, with the following results :

Name of district	Number of persons examined	Number of persons found infected with hookworm	Percentage of those examined found infected
Gurdaspur	1,323	1,076	81.32
Hoshiarpur	1,018	890	87.42
Sialkot.	1,090	575	52.75
Ambala	1,478	997	67.45
Gujrat	882	583	66.09
Jhelum	1,050	583	55.52
Rawalpindi.	1,285	379	29.49
Kangra	1,500	1,082	72.13
Attock	1,200	643	53.58
Ludhiana	900	749	83.22
Jullundur	1,200	1,015	87.50
Amritsar	1,050	726	69.14
Lahore	900	184	20.44
Gujranwala	900	379	42.11
Sheikhupura	900	187	20.77

Mass treatment by carbon tetrachloride has been carried out in Gurdaspur district only. The total number of persons who have received treatment in Gurdaspur district is 210,209.

An examination of approximately 600 persons treated, one month after treatment, shows that a reduction of 25 to 30%

in the numbers found infected follows treatment, and that in those found still infected after treatment the egg count is reduced by approximately 50%.

The installation of bore-hole latrines as domestic latrines for families has been adopted as an auxiliary measure to check spread of infection. This measure has had a very limited success owing to the prejudice of villagers against using any form of latrine.

Leprosy.

Organised measures for the control of leprosy in the Punjab date from 1931, when a provincial leprosy officer was appointed under the provincial branch of the British Empire Leprosy Relief Association, and a leprosy officer for the district of Kangra, where leprosy is much more prevalent than elsewhere in the Punjab. The provincial officer, between March 1931 and December 1936, surveyed 5,574 villages, with a population of 1,719,960. In 744 of these villages, 1,814 cases of leprosy were found.

Eighty leprosy clinics have been organised in rural dispensaries in fourteen districts of the province; 226 doctors have received training in the diagnosis, treatment and prevention of leprosy.

Intensive propaganda is carried out in all affected areas by means of lectures and magic-lantern demonstrations. Propaganda material is freely distributed in schools, at fairs, at public gatherings and in villages. Special courses of instruction in leprosy have been given to medical students and post-graduates attending the medical institutions in the province.

There are five leper homes in the province with a total accommodation of 650 beds. These leper homes have been in existence for many years and are administered by the Mission to Lepers. A grant for upkeep is given by the provincial Government through the Medical Department.

A NOTE ON THE METHODS EMPLOYED IN THE PUNJAB FOR DEALING WITH PLAGUE IN RURAL AREAS.

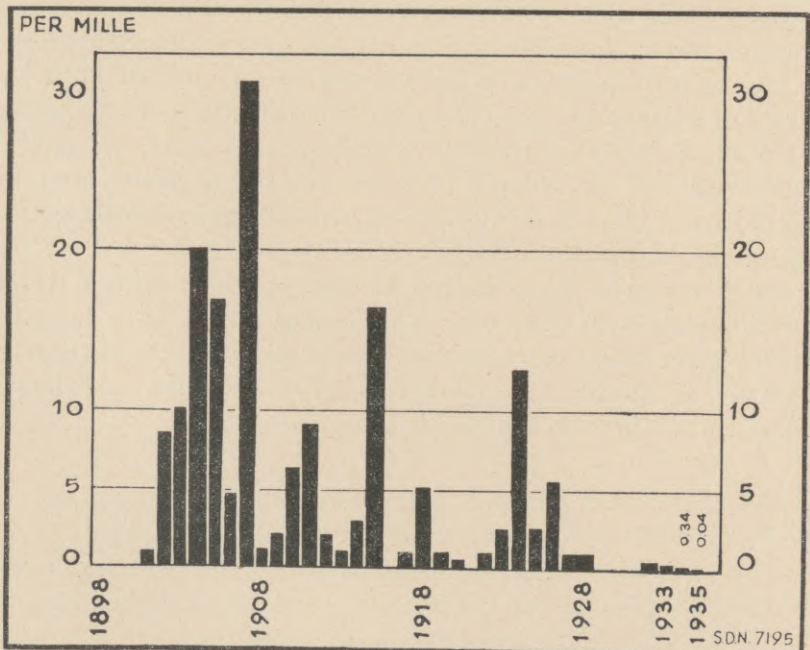
(a) *Incidence of Plague.*

The following table shows the number of deaths due to plague during the last twenty years :

Year	Total deaths in the Province	Year	Total deaths in the Province
1916.	3,278	1926	108,287
1917.	8,775	1927	8,452
1918.	95,615	1928	8,282
1919.	11,068	1929	2,053
1920.	6,137	1930	554
1921.	2,553	1931	1,150
1922.	7,780	1932	2,003
1923.	50,086	1933	1,789
1924.	251,261	1934	8,069
1925.	37,630	1935	976

The annual death rate from plague in the Punjab from 1898 to 1935 is given in the chart below.

Annual Plague Death Rate in the Punjab, 1898-1935.



Plague has never been entirely absent from the Punjab since its introduction in 1897. There have been marked rises in the number of deaths in individual years, occurring at irregular intervals. The intervening periods of relatively low mortality appear to be lengthening.

The disease has in recent years been mainly confined to a number of sub-montanic districts. In twelve out of a total of twenty-nine districts, the disease has not appeared during the last six years. All but two of these twelve districts has been infected within the last ten years.

Some idea of the relative incidence of plague in urban and rural areas may be obtained :

Urban Areas.

Year	Number of towns which reported plague	Number of deaths	Average number of deaths per town
1925.	76	4,642	61.08
1926.	113	9,910	87.70
1927.	46	922	20.04
1928.	34	870	25.59
1929.	9	106	11.78
1930.	2	12	6.00
1931.	10	110	11.00
1932.	14	132	9.43
1933.	7	109	15.57
1934.	21	318	15.14
1935.	14	240	17.14

Rural Areas.

Year	Number of villages which reported plague	Number of deaths	Average number of deaths per village
1925.	1,724	32,988	19.13
1926.	5,024	98,377	19.58
1927.	1,194	7,530	6.31
1928.	856	7,412	8.66
1929.	250	1,947	7.51
1930.	89	542	6.09
1931.	101	1,040	10.30
1932.	325	1,871	5.76
1933.	174	1,680	9.66
1934.	423	7,751	18.32
1935.	155	736	4.75

It is considered that the above data give a more accurate idea of relative incidence than rates per 1,000 of population.

(b) *Staff maintained for Plague Work.*

(1) *Permanent.* — Permanent staff employed solely on plague work in rural areas consists of four sanitary inspectors and 188 coolies in eighteen districts ; these are organised as gangs of three or more coolies and work under the control of the District Medical Officer of Health and his sanitary inspectors (there is normally one sanitary inspector in a district).

In addition to the above district staff, there is a permanent provincial cadre of ten sub-assistant health officers and fifteen sanitary inspectors available for anti-epidemic work in general and of whom full use is made when plague is prevalent.

(2) *Temporary.* — When plague is unduly prevalent, sub-assistant health officers and sanitary inspectors varying in numbers according to requirements are temporarily employed by the Government to augment permanent staff.

In nine districts, temporary coolie labour is employed during the plague season to augment permanent staff.

In seven districts, no special plague staff of any kind is employed, as these districts have been comparatively free from plague over a period of years.

(c) *Measures chiefly relied on.*

(1) The general sanitation of villages is receiving more and more attention :

(a) Drainage in and around villages ;

(b) The pitting of refuse and garbage outside the village.

(2) The storage of grain and other foodstuffs in such a manner that rats may not get access to them.

Grain stored in dwelling-houses is now almost universally kept in kothis of dried mud raised 1-2 feet above the floor level.

(3) The ventilation of houses and admission of sunlight and air.

(d) *Procedure on the Occurrence of Outbreaks.*

(1) *The staff deputed.* — The District Medical Officer of Health with a sanitary inspector and one or more coolie “gangs” proceed to the village. If required, local district staff is supplemented by provincial staff—one or more sub-assistant health officers and sanitary inspectors.

Following measures in the village in which the occurrence of plague has been notified, the staff proceeds to neighbouring villages and any other village in frequent communication with the infected area.

(2) *Inoculations.* — These are carried out by the District Medical Officer of Health or a sub-assistant health officer. The object is to inoculate every individual in every village visited, and frequently this is successfully done. Inoculation is voluntary and cannot be enforced by law.

(3) *Rat destruction.* — Trapping is gradually falling into disfavour. In the eight districts in which this method is adopted, 1,157 traps are in use. This method is costly and entails transport difficulties; traps are liable to get into disrepair and baiting is often not properly done. Owing to religious feeling, rats caught in wire-cage traps are often liberated.

Where used, traps are immersed in boiling water and scrubbed and oiled after each catch.

Poisoning. — Barium carbonate is used in a basis of flour of the grain commonly used in the area.

BaCO ₃	. . . . .	1½ lb.
Flour	. . . . .	1 ½ lb.
Water to make a thick paste.		

The above is divided into 1,600 pills.

The pills are laid late in the afternoon and those remaining next morning are collected.

Fumigation. — This is now mainly confined to rat-holes, fumigation of rooms being found more or less impracticable owing to difficulty in rendering them airtight.

Bhoosa battis are still extensively used, but are being gradually replaced by cyanide preparations.

(4) *Evacuation.* — Evacuation has in recent years been practised in eight out of twenty-seven districts. Evacuation is advised in most outbreaks : whether it is adopted or not depends mainly on the weather conditions : if favourable, villagers are willing to camp out in the fields in temporary chhappar huts which they themselves ordinarily provide. Fear of theft from vacated dwellings is often a bar to evacuation.

(5) *Control of movements of persons, grain, etc.* — An effort is made to notify the departure of individuals or groups of individuals from an infected area, to the appropriate authorities in another area to which these individuals are known to be going. In practice, however, it is very difficult to ascertain where people go who leave an infected area.

Disinfection. — Exposure of bedding and clothing to the direct rays of the sun is the only method adopted to any extent : it is readily adopted and regularly carried out while an epidemic lasts. Spraying of houses with insecticides has been undertaken to a very limited extent.

Poisoning by BaCO_3 and fumigation of rat-holes by bhoosa battis or calcium cyanide are the two methods on which reliance is placed and which are ordinarily practised. These methods are used together ; their combined efficacy in one district may be gauged from the following :

The two measures were applied in each of fifty-two villages once a month for three successive months. Ten poison baits were laid in every room in the evening, and on the following day every rat-hole in every house in which baits were laid was fumigated.

A record was kept of the number of rat-holes present in the houses of these fifty-two villages and the number of rats found dead after deratting measures had been carried out. A comparison of figures recorded on the occasion of the first visit to the villages with those recorded on the occasion of the third visit showed a reduction of approximately 44% in the number of rat-holes and of 75% in the number of rats found dead.

(e) *Procedure in Inter-epidemic Periods.*

“ Off-season ” anti-plague measures are routine in all districts in which plague occurs periodically. Grants in aid of such measures are frequently made by the Government to local bodies not able themselves to finance such measures. Effort is concentrated on :

- (i) All villages with a bad plague history ;
- (ii) Villages in which rat or human plague occurred towards the end of the last plague season, and villages within a five-mile radius of (i) and (ii).

A programme of thorough deratting is drawn up and systematically carried out. Coincident with this, an effort is made to improve general sanitation with special reference to those conditions which lead to rat infestation.

The villagers are instructed regarding the nature of the disease and its spread and methods of prevention by means of talks and lectures, often illustrated by magic-lantern slides.

Systematic rat-proofing of houses, grain godowns, etc., has not yet been inaugurated.

* * *

A NOTE REGARDING TUBERCULOSIS IN THE PUNJAB.

There is no special tuberculosis service in the Medical or Public Health Departments. Training of medical students in tuberculosis is specially provided for at the Mayo Hospital, Lahore.

Mortality for tuberculosis.

The population of the Province is 23,460,267. No information concerning mortality from tuberculosis is available prior to 1935.

Deaths from Tuberculosis in 1935.

	Number of deaths		Death rate per 1,000		Provincial
	Rural	Urban	Rural	Urban	
Pulmonary Tuberculosis.	8,269	1,901	0.40	0.65	0.43
Other forms	2,543	157	0.12	0.06	0.11

(Figures for different age groups are not available.)

The only information available regarding the incidence of tuberculosis in different groups of individuals is contained in “A Study of the Incidence of Tuberculosis”, based on observations made in a part of Lahore.

A limited amount of information regarding the incidence of tuberculosis in different age groups is also contained in the above-mentioned report. No special “public health and administrative machinery” exists for the control of tuberculosis.

(a) *Registration of Deaths.* — In rural areas, births and deaths are reported by village chaukidars (watchmen), who are provided with two books—one for births and the other for deaths. In these, entries are made, on the chaukidar’s report, by a resident of the village who can read and write, and the lambardars (village headmen) of each village are responsible that these entries are duly made. The chaukidars take their books to the thana (police-station) fortnightly, and from these books and from the verbal enquiries made from the chaukidars, the police muharrirs compile the statistics, which they maintain. Fortnightly returns are submitted, through the superintendent of police, to the civil surgeon. The civil surgeon forwards fortnightly, monthly and annual returns, compiled from the police returns, to the Director of Public Health, Punjab. From the returns so received, consolidated monthly and annual returns are prepared in the office of the Director of Public Health.

In municipal towns, when a birth or death occurs in any household, the head of the family is required to make a report of the occurrence within three days. If, for any reason, he is unable to do so himself, the report is made by an adult member of his family. A birth may be notified by the midwife employed. If a birth or death occurs in a household in which there is no adult male member, the report is made by the sweeper of the mohalla (street or lane). The mohalladar (a responsible resident of the mohalla) and the sweeper are jointly responsible that there is no omission.

In most municipalities, rules or by-laws have been adopted under the Municipal Act, in regard to the proper registration of births and deaths. In towns where no special by-laws for the

registration of vital statistics have been adopted by the municipal committee but where the watch and ward is done by the municipal police, the constable of each beat reports all deaths occurring in his area. The police are assisted by the sweepers of the mohalla.

Birth and death registers are kept at municipal registry offices, and weekly returns compiled from the registers are forwarded to civil surgeons for incorporation in their district weekly returns.

A consolidated weekly return showing the births and deaths registered in municipal towns with a population of 10,000 and upwards each, and a consolidated monthly return showing the births and deaths registered in towns with a population of 20,000 or upwards as well as in districts (rural circles), are published in the Punjab Government *Gazette*.

The accuracy of the registers maintained by the police and municipalities is verified by assistant directors of public health, district medical officers of health, civil surgeons, superintendents and assistant superintendents of police, Tehsildars, Naib Tehsildars, Kanungos, superintendents of vaccination and vaccinators.

(b) *Notification of Tuberculosis*. — Tuberculosis is a notifiable disease under the Municipal Act in all the towns of the province. It is also notifiable in small towns. Notification is not compulsory in rural areas.

(c) *Anti-tuberculosis Organisation*. — There exists an anti-tuberculosis sub-committee of the Red Cross Society, Punjab Branch, which was formed in June 1931. This sub-committee arranged for the carrying-out of a tuberculosis survey of part of Lahore, the results of which are embodied in the report mentioned above. The survey cost Rs. 8,058, Rs. 7,000 of which was granted by the King George's Thanksgiving (Anti-tuberculosis) Fund. The services of a medical officer were given free by the Punjab Public Health Department. Owing to lack of funds, the sub-committee has been in a state of inactivity since the survey was completed.

The Red Cross Society, Punjab Provincial Branch (as distinct from the anti-tuberculosis sub-committee), gives grants in

aid of anti-tuberculosis work: it pays Rs. 75 per month towards the maintenance of Punjabi soldiers invalided on account of tuberculosis who are under treatment at the King Edward Sanatorium, Dharampore, Simla Hills.

The Government gives a grant of Rs. 7,500 per annum to the King Edward Sanatorium, Dharampore, and Rs. 5,000 per annum to the Jubilee (Mohammad Hussain) Sanatorium, Samli (Murree Hills).

At Lahore, Jullundur and Ludhiana, tuberculosis dispensaries exist.

(d) *Tuberculosis Clinics.* — *Tuberculosis* clinics exist at Lahore, Jullundur and Ludhiana.

Sanatoria.

	Number of beds
King Edward Sanatorium, Dharampore . . .	90
Jubilee Sanatorium, Samli	72
Rana Durga Singh Sanatorium, Dharampore .	50
Lady Irwin Sanatorium, Sanawar	Unknown
Sh: Gulab Devi Hospital for Women, near Lahore.	Unknown

Accommodation for tuberculosis patients is provided at the following hospitals:

	Number of beds
Mayo Hospital, Lahore	74
Infectious Diseases Hospital, Lahore	10
Memorial Hospital for Women, Ludhiana . .	Unknown

Tuberculosis patients are admitted to all infectious diseases hospitals and, where no infectious diseases hospital exists, to general hospitals (under the Medical Department) all over the province, at the discretion of the medical officer in charge.

(e) No organisation exists for the after-care of tuberculosis patients.

22. NOTE ON PUBLIC HEALTH AND MEDICAL SERVICES IN SIND

by

Lieut.-Colonel N. BRIGGS, I.M.S.,
Director of Health and Prison Services, Sind.

Area : 46,378 square miles.

Population : 3,887,070.

Districts: 8.

HEALTH ORGANISATION AND MEDICAL SERVICES IN SIND.

Sind was constituted into a separate province on April 1st, 1936, prior to which date it was a division of the Bombay Presidency.

The Director of Health and Prison Services is the head of the Public Health, Medical and Prisons Departments. This arrangement may be economical for a small deficit province and has the advantage of ensuring complete co-operation of the Public Health and Medical Departments.

Medical Aid.

Before April 1st, 1936, Sind was a division of the Bombay Presidency and the curative medical affairs were under the control of the Surgeon-General with the Government of Bombay.

Since separation, the medical affairs of the province are under the control of the Director of Health and Prison Services, who is also the head of the Health and Prisons Departments.

There are seven large hospitals with fifty-five dispensaries in the province under his charge. There are many more dispensaries and maternity homes run by charitable organisations or local bodies. Each of the eight districts is under a civil surgeon or a district medical officer, as the case may be.

Women and children are treated at all the civil hospitals and dispensaries, separate accommodation being provided in each. There are hospitals arranged through the Lady Dufferin Fund at Karachi, Shikarpur, Hyderabad and, at some of the district

headquarters, the Red Cross Society, other charitable organisations, and local bodies maintain institutions for the treatment of women and children.

The Civil Hospital, Karachi, is a training-school for nurses, the midwifery being taught at the Lady Dufferin Hospital, Karachi. The Zenana Mission Hospital at Hyderabad turns out trained dais for mofussil work.

Medical School.

The Medical School at Hyderabad is open to male and female students and turns out annually fifteen qualified doctors (L.C.P. & S., Bombay).

Mental Hospitals.

There is a mental hospital at Hyderabad Sind, the Sir Cowasji Jehangir Mental Hospital, with accommodation for 203 male and 45 female mental patients.

The Civil Surgeon, Hyderabad, is the Superintendent.

Government Personnel.

In Sind, the Government public health staff working under the Director of Health and Prison Services, consists of one Assistant Director of Public Health, an officer in charge of the Public Health Laboratory, who has two subordinate service assistants, two clerks and laboratory attendants and menials, and five inspectors of sanitation and vaccination. In addition, there is the clerical and menial staff at headquarters in the offices of the Director and Assistant Director.

Duties of the Assistant Director of Public Health.

(a) Vaccination (in seven out of the eight districts of Sind) and all that pertains to it ; the control of the vaccination staff and inspection of the quality and quantity of work done.

(b) The inspection of birth and death registers and the compilation of vital statistics submitted to him by the revenue and municipal recording officers.

(c) The rendering of advice with regard to the sanitation of the various urban and rural circles in the province, the submission of special reports on the sanitary survey of towns and large villages, and the

writing-up of village sanitary inspection books where such are kept. Also, the rendering of special advice with regard to any sanitary defects which may come to his notice, or regarding which advice is asked by municipalities or other local bodies.

(d) The close supervision of the general health of the province, the ascertaining of the movements and causes of various epidemic diseases and the prompt advising of remedial and preventive measures dealing with epidemic outbreaks. In the absence of a rural health staff, except in one district, the Assistant Director of Public Health has to personally direct and supervise preventive measures in rural areas, and also in those towns where there are no health officers.

(e) He inspects dispensaries when on tour and advises the medical officers on sanitary defects of the towns and villages where the dispensaries are situated.

(f) He attends the large fairs and gives advice on sanitation in the fair areas.

(g) He acts under the Indian Factories Act, as an additional inspector of factories and advises the authorities on sanitation of the factories and the health conditions of the workmen. He also inspects schools, police lines and sites proposed for schools, markets, wells, burial-grounds, etc.

(h) He is the lecturer in hygiene and public health at the Hyderabad Medical School.

Inspectors of Sanitation and Vaccination.

There are five inspectors of sanitation and vaccination and their beat extends to approximately a district and a half each.

Vaccination.

In six out of the eight districts in Sind, vaccination is entirely under the control of the Assistant Director of Public Health.

In Sukkur district, vaccinators are under the control of the district local board as regards appointment, leave transfers and punishment, but their work is supervised by the Government Inspector of Sanitation and Vaccination and the Assistant Director of Public Health.

In Larkana district, vaccination is entirely, since 1934, under the control of the district local board, subject to inspection by the Assistant Director of Public Health and the submission of vaccination returns to him. The district local board has its

own health officer and inspector, who supervises the work of the vaccinators in that district.

The District Vaccination Act, making vaccination compulsory, has been applied to eight towns in Sind. Efforts are being made to persuade more municipalities to apply for the application of the Act, as at present this can only be done at the request of the municipalities.

Lymph is obtained from the Vaccine Institute, Belgaum (Bombay Presidency). The local bodies pay for the supply on the basis of population.

Rural Sanitation.

Under the District Local Boards Act of 1923, it is the duty of the district local boards to make adequate provision for (1) public vaccination, sanitary works and measures necessary for the public health ; (2) the construction and repair of hospitals, dispensaries, markets, etc., and the management and maintenance of these institutions ; and (3) the construction and repair of public tanks, wells and waterworks. The district local board has the power to make bye-laws for the control of markets, dairies, creameries, slaughter-houses, burial-grounds, offensive trades, etc., and may impose penalties for the infringement of such bye-laws. The board can also make rules with regard to the protection of drinking-water supplies.

The appointment of a health officer is not laid down as compulsory under the Act, but, if such appointment is made and is approved by Government, the Government agrees to pay a contribution of two-thirds of his salary.

Under the District Municipal Act, certain large villages are constituted as notified areas. No area shall be made a notified area unless it contains a town which is the headquarters of a taluka, or is within a distance of one mile from a railway station. A notified area has almost all the powers of a municipality. There are eight notified areas.

The Village Sanitation Act was passed for the constitution of sanitary committees and sanitary boards for the purpose of improving the sanitary condition of villages. These bodies have powers to make rules for (1) procuring and preserving for the use

of the villages an adequate supply of potable water ; (2) the cleansing of streets and open spaces ; (3) the prevention of accumulation of offensive and noxious matter ; and (4) for the preventing of nuisances and insanitary acts, etc. These sanitary committees have no power to levy taxes and their income is almost entirely dependent on Government, local board and popular contributions. In the majority of cases, their funds are hardly sufficient to employ a few sweepers and provide for the lighting of streets. There are 224 sanitary committees.

Budgets.

The Government expenditure on the Public Health Department in Sind is estimated to be Rs. 2,24,000 for the year 1936/37.

Municipal expenditure on public health varies with the size of the town. Figures are not available.

As regards district local boards, seven out of the eight spend about 3 to 4% of their income on public health, most of which is on account of vaccination and contribution to sanitary committees. The Larkana District Local Board, the only local board in Sind having a district health officer and health staff, spends approximately 15.7% of its income on public health.

RURAL RECONSTRUCTION.

The village uplift scheme has been introduced in Sind only since the last two years. Funds allotted by the Government of India for this purpose and the expenditure in the districts are entirely under the management of district revenue officers—the collectors. The Public Health Department is sometimes consulted regarding measures pertaining to public health. Steps taken in connection with improvements in sanitation and public health measures vary in the different districts and comprise one or more of the following :

- (1) Appointment of touring medical officers for medical relief and propaganda regarding sanitation and public health ;

(2) Appointment of touring midwives, who conduct maternity cases in villages and give instructions to village dais ;

(3) Monetary assistance to sanitary committees of the villages for drainage, the provision of cesspools and improvements to or construction of markets and wells ;

(4) Construction of tube wells in villages not having a satisfactory water supply.

In some districts, a few villages are selected and improvements restricted to these. Intensive propaganda by means of magic-lantern lectures and demonstrations is carried on and the help of the local officials and inhabitants is sought to carry out as many improvements in sanitation as possible. In such villages, improvement is noticeable and in some cases marked.

SANITARY ENGINEERING AND SANITATION.

A Board of Public Health Works was established in June 1936. Its constitution is as follows : the Revenue Commissioner in Sind, President ; the Chief Engineer in Sind and Secretary to Government, Public Works Department ; the Director of Health and Prison Services, Sind ; the Consulting Public Health Engineer, Sind, who is also the Secretary of the Board and two non-officials appointed by name for a period of two years and eligible for reappointment.

The board will be the advisers of Government on all general questions of sanitary policy, including the formulation of the principles to be followed for the healthy and orderly growth of inhabited areas and the preparation and submission to Government of type designs for that purpose, and will also be consulted by the Government regarding large individual schemes of sanitary improvements. Tube wells are gradually coming into use.

NUTRITION.

The problem of nutrition in the province has so far not been investigated.

MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

Malaria is the disease most prevalent in the rural areas of Sind.

The Government is spending Rs. 23,000 per annum on the cheap sale and free distribution of quinine. Quinine is sold at cheap rates to Government departments and to the public through the medium of post offices. It is distributed free in the smaller villages which are not within 3 miles of any dispensary or hospital. This is done through the agency of the public health, revenue and agricultural officers and through well-established charitable societies and institutions—*e.g.*, the Red Cross Society. The administrative officers of local board schools and officers of the Education Department are supplied with large quantities of quinine tablets for distribution in the rural schools.

The Government appoints every year, during the malaria season, ten to twelve temporary touring medical officers for anti-malaria duty. These medical officers tour the rural areas where no medical aid is normally available, treat the villagers for malaria and other common diseases, make sketches of mosquito-breeding places in the large villages, send mosquitoes and blood-slides for examination, and give advice to the inhabitants on simple preventive measures against malaria.

Propaganda by means of pictorial posters showing the importance of quinine treatment in malaria, simple preventive measures and the use of mosquito-nets has been commenced this year.

The measures adopted by the local boards vary. These are usually limited to the appointment of a touring medical officer and some distribution of free quinine.

Other measures proposed are :

The formation of provincial and district anti-malaria boards ;

The appointment of a malariologist with the requisite staff ;

The provision of travelling motor-dispensaries, one for each district, suitably equipped with drugs, instruments and propaganda material, under the charge of a permanent subordinate service medical officer.

Plague has been absent from Sind since 1928, except for six cases that occurred in Karachi town in the spring of 1936. No measures are being adopted in rural areas for the prevention of this disease.

Ankylostomiasis is not prevalent to any great extent.

Tuberculosis is not markedly prevalent in rural areas and no special measures are adopted.

Most of the hospitals have separate portions set aside for patients suffering from this disease. In Karachi, a separate municipal dispensary is provided by the municipal corporation, to which the Government gives a grant.

Pneumonia is widely prevalent during the cold weather following the malaria season. The touring medical officers appointed as mentioned under malaria also treat all cases of pneumonia that are brought to their notice.

Yaws is not prevalent in Sind.

Leprosy is not commonly met with in rural areas and no measures are adopted. There is only one leper asylum in this province, at Karachi (the Hiranand Leper Asylum). Most of the inmates belong to Madras and Makran. This asylum is managed by a Committee, the municipal corporation and Government giving liberal grants.

The extent of the prevalence of mental disease in rural areas is not known. There is one mental asylum in Sind, at Hyderabad, with accommodation for 203 male and 45 female patients.

23. NOTES ON MEDICAL AND PUBLIC HEALTH ORGANISATIONS IN THE UNITED PROVINCES.

Area : 106,248 square miles.
Population : 48,408,763.
Districts : 48.

A. MEDICAL ORGANISATION IN THE UNITED PROVINCES

by

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MEDICAL SERVICES.

Medical Relief.

During the year 1935, 698 hospitals and dispensaries were functioning and 7,637,795 patients were treated in State public, local fund, private aided and subsidised dispensaries. The total number of patients treated in all classes of medical institutions were 9,157,466. The total number of beds available for males and females was 9,120. The total number of surgical operations performed during the year 1935 was 343,004.

The total income of all hospitals and dispensaries from all sources, including Government grants, was Rs. 39,19,370, and the total expenditure Rs. 32,93,664. The unspent portion represents the cash balance of various institutions, which has been carried forward to the following year.

In 1935, there were 135 private hospitals and dispensaries, of which fifty-two received aid from Government. Fifty-two railway dispensaries were also operating during the year. In addition, fifty subsidised dispensaries were working in the rural areas of these provinces.

The number of medical practitioners who settled down in rural areas to render medical aid to poor patients was twenty-one. The scheme for rendering medical aid to the rural areas by the opening of subsidised dispensaries was started in 1926 and has been gradually expanding. That progress has not been as rapid

as is desirable is due to lack of money and partly owing to the fact that the medical practitioners are not eager to settle down in rural areas, where they do not enjoy the amenities of city life. The Government, however, is endeavouring to encourage this scheme by allotting more grants for such dispensaries and by raising the rates of subsidies to private medical practitioners. Medical relief is also being given through the indigenous system of medicines. A grant of Rs. 34,500 exists for this purpose in the budget. A grant of Rs. 1,08,000 is also made to the Ayurvedic and Unani State-aided schools.

Medical Education.

(1) *King George's Medical College, Lucknow.* During the year 1934/35, forty-nine students were admitted to the faculty for the degree of M.B.B.S., on the result of the competitive pre-medical test. Out of the forty-nine students, forty-one were sent to Agra for the course in mental diseases.

Training in midwifery has been given to students at the Queen Mary's Hospital, Lucknow, from the year 1932—i.e., from the time this hospital was opened. Thirty-four students completed their training in practical obstetrics during 1935. The number of maternity cases available for students for the year ending December 31st, 1935, was 239, as compared with 115 in 1932. Ten provincial medical service officers attended the post-graduate course. The courses of study given at the college and the examinations for the university degrees were scrutinised by the Medical Council of India during the early part of the year. Both inspections were entirely satisfactory and degrees have been recommended for recognition by the General Medical Council of England.

(2) *Medical Schools, Agra.* The number of students admitted in the Men's Medical School, Agra, in the year 1935 was fifty. Post-graduate courses for clinical instruction were held and five officers of the Provincial Subordinate Medical Service appeared for the M.S.M.F. diploma. The number of students admitted in the Women's Medical School, Agra, was nineteen at the close of the year. The Principalship of the Agra

Medical School, which was held by the Superintendent of the Thomason Hospital, Agra, is now under a separate officer of the I.M.S. cadre.

Medical Relief for Insane.

Medical relief for the insane exists at three mental hospitals—at Agra, Bareilly and Benares. Benares is reserved for criminal lunatics. The total admissions during the year 1935 were 399, making the total population of 1,772. Out of these 1,772 patients, 239 were cured, 425 were discharged and 96 died. The total expenditure at the mental hospitals during the year 1935 amounted to Rs. 2,35,772.

Schemes for improvement could not be pushed through in their entirety owing to financial stringency. Among the improvements made at our mental hospitals, the most important are as noted below.

The installation of electric lights and fans in the Mental Hospital at Agra. Both at Agra and Benares the establishment of laboratories has resulted in more general examination of patients' stools. At the Agra Mental Hospital a prophylactic course of anthelmenthies is now administered to each patient every six months. But further progress can hardly be expected until the larger staffs and material improvements required can be provided.

B. PUBLIC HEALTH ORGANISATION IN THE UNITED PROVINCES

by

Dr. K. P. MATHUR,
Director of Public Health, United Provinces.

I. HEALTH AND MEDICAL SERVICES.

Principles governing their Organisation.

Medical care of the people in the United Provinces is the concern of the Medical Department, whose head is the Inspector-General of Civil Hospitals. Health services are under the control

of the Director of Public Health, who is independent of the Inspector-General of Civil Hospitals. In rural districts, medical care and public health services had been under a single officer—*e.g.*, the civil surgeon, who is the head of the Medical Department in the district—until the year 1922, when the first beginnings were made towards separation of the two functions by the inauguration of the rural health service. This service is now in force in thirty-four out of the forty-eight districts of the province. Public health care of the people in these areas is now the concern of district medical officers of health, civil surgeons having no responsibilities for the same. In the remaining fourteen districts of the province, however, the old system prevails and civil surgeons continue to remain responsible for health measures in the rural districts.

The old system under which the heads of the medical administration in the districts were responsible for public health care of the people did not work satisfactorily in view of the volume of purely medical work that these officers have to perform—*e.g.*, duties connected with the administration of hospitals and dispensaries, major operations, medical attendance on Government servants, medico-legal work and administration of jails. They were thus unable to spare the time required for personal tours of inspection in rural areas for investigation of infectious disease or the study of local conditions with a view to enforcing measures of rural hygiene apart from control over vaccination work. It was for this reason that rural health work was placed under a separate officer in each district, and it is the policy of Government now to complete such separation in all the districts of the province. Collaboration between the two departments is, however, close and constant, and is secured in the following ways :

(i) *In district areas*, by orders of Government, " Medical and Public Health Departments should always act in harmony with one another and the district medical officer of health should always be ready to receive advice from the civil surgeon and to act upon it when necessary. . . as regards maternity and child welfare work, the duty of advising district boards rests both on the civil surgeon and district medical officer of health and both departments should work together and render each other all the co-operation possible."

The civil surgeon and the district or municipal medical officers of health are members of the local child welfare committees, the district branches of the Indian Red Cross Society and other committees devoted to medical and public health interests. The civil surgeon regularly receives from district medical officers of health reports of the incidence of infectious disease in the district and reports to the district medical officer of health any abnormal increase in attendance at rural dispensaries for malaria.

(ii) *At administrative headquarters*, the Inspector-General of Civil Hospitals and the Director of Public Health consult each other on matters with which both departments may be interested. In addition, both heads of departments are members of all the important committees connected with medical or public health work—viz., the Board of Public Health, the State Medical Faculty, the Medical Council, the Executive Committee and Branch Committee of the U.P. Branch of the Indian Red Cross Society and the Executive Committee of the British Empire Leprosy Relief Association.

The decentralisation has increased the efficiency of rural health service, as whatever has been done in the United Provinces in the last fifteen years in the field of rural hygiene is in a large measure due to the provision of a separate and whole-time staff for public health work having special knowledge of such work. The extra financial outlay by Government and local authorities on this separate service has been justified by the results achieved. The public health organisation well suited to the needs of India is the Rural Health Service in the existing form in the present financial condition, and needs to be expanded in the scope of its activities as well as in the number of workers engaged.

In the normal course of its work in rural districts, the Public Health Department secures the collaboration of the other departments of Government concerned in the well-being of the people—e.g., the Department of Education in connection with health education in schools, Junior Red Cross work, etc., the Department of Co-operation in connection with the training of villagers in first aid in infectious diseases and in common accidents, and the Department of Agriculture in connection with the preservation and storage of manure and propaganda. (For control of epidemics see *ultra*.)

Personnel.

(a) *Doctors.*

The strength of the rural health service consists of one medical officer with public health qualifications who is designated "District Medical Officer of Health" and usually one assistant medical officer of health, who also is a medical officer of a lower grade and in possession of a licence in public health. In very large units of administration an extra assistant medical officer of health is provided, and in only one unit are there three assistant medical officers. There are, besides, one sanitary inspector for each revenue sub-division of the district. They have no training in medicine, but have an elementary training in public health. The area in charge of the rural health staff is, on the average, 2,000 square miles and the population 900,000. The staff represents thus the barest minimum, and an increase in the number is a question of funds. Medical officers in charge of rural dispensaries (who are employed under the Medical Department) are, by arrangement with the Medical Department, required to give inoculation, vaccination or undertake health publicity work, but only in the village in which the dispensary may be situated. In view of preoccupations connected with their substantive duties, they are unable to give any time for health work outside such villages.

The subordinate public health staff for rural public health work in the United Provinces is solely recruited from the medical licentiates (L.M.P.) trained at the Agra Medical School, as well as from similar approved medical schools in the other provinces of India. They undergo a course of training in public health for nine months at the Provincial Hygiene Institute after obtaining their professional qualifications and are examined and, if successful, are awarded the Licence in Public Health (L.P.H.) by the State Medical Faculty, United Provinces. This *training in public health for medical licentiates* was established in 1920 in the United Provinces and is the first of its kind in India.

I am of opinion that this course of training provides the Public Health Department with a cheaper and efficient type of medico-public health workers for public health services in

the rural areas who work as medical officers in charge of travelling dispensaries and assistant medical officers of health.

(b) *Auxiliary Staff.*

For some years past the Public Health Department has given very elementary training in first aid in the commoner accidents and in the prevention of infectious disease to at least two *adult villagers* in many villages, to rural school-teachers and to the subordinate revenue, police and canal officers who work and reside in villages. The object of this training is to enable these persons to render help pending the arrival of a doctor or public health worker. The schoolmaster or other literate person in the village is also usually supplied with a small *box containing simple medicines* of an indigenous character but of known therapeutic value, and printed instructions for their administration. These thus constitute the sole auxiliary staff and equipment in the field of medical and preventive work. Medicines are in great demand, and the medicine boxes are very popular, although their range of usefulness is limited, as only a few diseases can be treated with these drugs by the class of people to whom this work is entrusted.

It is recognised that the foundations of preventive medicine and hygiene should be laid in the homes of villagers by teaching the women and children in rural areas. This task can best be performed through the service of *public health nurses*. The inauguration of such a public health nursing service as an integral part of the Public Health Department is a question for the future. Such workers should be capable of making a tentative diagnosis and treating ordinary ailments.

Owing to caste prejudices and social customs, only girls from the lower strata of society have so far come forward for training as nurses, health visitors and midwives, and these have usually received a low standard of preliminary education. It is hoped that parents of the better classes will recognise the value of such training for their wards.

Health and Preventive Activities.

It has been the policy of the Public Health Department in the United Provinces to concentrate in the first instance on

the following aspects of the public health problem in rural areas :

- (i) Improvement of the drinking-water supply ;
- (ii) Surface cleanliness ;
- (iii) Provision of first aid in common accidents and infectious disease ;
- (iv) Control of communicable diseases.

Our public health service is based on the principle of regional divisions and it can be made more effective by concentrating efforts, *e. g.*, by establishing centres or *health units* in various districts. This is necessary in view of the complicated task of promoting public health in forty-eight districts covering an area of 106,248 square miles with a population of 44,334,376, living in 105,640 villages. In view of the ignorance of the masses, who require continuous health supervision instead of periodical advice, it is impossible for the existing public health organisation to deal effectively with the sanitary needs of the entire area in its charge. The policy of the department, therefore, has been to apply the various measures of rural sanitation in a small area for some considerable time so as to produce definite results. After the people in such an area have been educated as to the value and need for better sanitation, the activities of the staff are shifted to another area. It is expected that, in this way, several such demonstration areas will be established over the districts in course of time, in which the various forms of rural public health improvements may continue to function—*e.g.*, improvement of the drinking-water wells, construction of sanitary conveniences like latrines and urinals, soakage pits for the reception of house sullage, bathing-platforms, pits for the reception of manure and refuse, training of village midwives in clean midwifery, etc. The *health unit* in Partabgarh and the “*modified health units*” in nine other areas, are indicative of this attempt to concentrate health work in selected areas.

Budget.

	Total expenditure in one year Rs.	Expenditure per head of population Rs.
Medical (rural medical relief) (figures furnished by the Inspector-General of Civil Hospitals) :		
(a) Central Government	Nil	Nil
(b) United Provinces Government . . .	46,523	—
(c) Local boards (Western system only) .	17,46,191	—
	17,92,714	0.04
Public health (rural) :		
(a) Central Government	Nil	Nil
(b) United Provinces Government . . .	11,49,219	—
(c) Local boards	5,52,268	—
	17,01,487	0.04

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

The principle in connection with the enforcement of health measures in all the schemes which aim at the improvement of health of the masses in rural areas has been "persuasion". Compulsion has been resorted to only when this has been dictated by epidemics, or when the correction of a recalcitrant individual has been essential. Vaccination and inoculation for plague and cholera is not compulsory in rural areas. Consequently, no compulsion is exercised for these in any form ; but all means of persuasion are applied, such as personal talks by the rural health staff, lectures, cinema films and magic-lantern shows. Inoculation is comparatively more popular in areas where the health staff have been in existence for some years than in districts where they have not been appointed or have been recently appointed. A great deal of attention has been given to the rural schools in recent years with a view to the formation of health ideals in the minds of the rising generation. The syllabus for the teaching of hygiene in the primary and vernacular schools has been revised and the subject now forms an integral part of the school curriculum.

In the field of rural hygiene, the value of enlisting the co-operation of the various grades of officials of civil administration has been recognised for a long time. For example, the village revenue officials, village constabulary, subordinate officers of the irrigation department and the rural schoolmasters are given training in elementary hygiene, in methods of dealing with infectious disease and first aid, so that they may be of help to the people when occasion arises or until the matter can be attended to by a proper medical or public health authority. The organisation of junior Red Cross groups in recent years has also been an important feature in this direction. Up to the end of 1935 there were, in the whole province, 3,057 groups with an enrolment of 83,391 ; 93% of these were in rural areas.

Cinema films on public health subjects have been by far the most popular means of propaganda in the United Provinces, as they depict in realistic scenes among familiar surroundings the causes and modes of spread of infectious diseases. Such films have been prepared on cholera, smallpox, malaria, tuberculosis, leprosy, maternity, child welfare, care of the baby, physical exercise, temperance, four films on pilgrimage, flies, health unit activities, junior Red Cross activities and milk, and, as the majority of villagers are unable to read the captions, even though they are in vernaculars, they are explained through the medium of loud-speakers.

A motor-van has been fitted up by the United Provinces branch of the Indian Red Cross Society specially for such demonstrations at fairs and gatherings in roadside villages and carries a few health models, besides the operators. In places not served by metalled roads, local district health officers have fitted up country bullock-carts with magic-lanterns and slides and a few inexpensive models, which are able to reach remote tracts served by the most elementary kind of roads. In schools, the best form of propaganda has been found to be the display of illustrated charts and models, as the school-teacher can always explain them.

Propaganda has not so far been undertaken among women in rural areas because of the lack of suitable women workers. Here, again, the importance of recruiting and training suitable women for public health work as public health nurses should

be stressed. As mentioned previously, efforts made in the line of health propaganda must be kept up steadily by a local paid public health agency and directed towards women and children by public health nurses to produce lasting results. When maternity and child welfare work penetrates farther into the villages, it will be possible for health visitors in course of their substantive duties to give some instructions to the women on home hygiene and nutrition besides child-rearing.

The great importance of co-ordinating the efforts of the different departments in the scheme of rural reconstruction undertaken by the United Provinces Government has been recognised from the outset, and for this reason district officers, who are the heads of civil administration in the area, have been entrusted with the general control of affairs. It is under their general direction that the local heads of the different departments are carrying on their different activities. Improvement of the health of the masses is one of the important items of work undertaken in the programme of rural reconstruction by the Government in recent years.

III. SANITATION AND SANITARY ENGINEERING.

Housing.

The problem of rural housing has been under the consideration of the United Provinces Public Health Department for a long time. About 90% of the rural population are agriculturists who cultivate land leased to them by landlords. Tenants' houses in India are not provided by the owners of land. Owing to the fear of ejection from land, tenants build for themselves houses of the cheapest kind possible. The system of land tenure has lately been improved very considerably and tenants and their successors now have greater security of occupation. It is expected that the present objection to the investment of money on the construction of houses of a better type which was prevalent on the ground of insecurity of tenure will now gradually disappear.

Apart from the above, the present state of insanitary housing is due to the extremely low standard of living and ignorance

that prevail among the rural population in India. With better economic status brought about by improved agriculture and more education, it is possible that a better type of houses will be constructed by tenants. In view of the cost involved, it is impossible for the landowners, or even the State, to provide sanitary houses for the tenantry without the active co-operation of the people.

In the year 1924, a sub-committee of the United Provinces Board of Public Health was appointed specially to go into the question of rural housing. After a great deal of consideration this sub-committee prepared designs of (i) a model village house and (ii) a model village. These were circulated, but the response has been practically nil, owing to the inherent difficulties connected with housing of tenants pointed out above.

Water Supply.

A great deal of attention has been given by the United Provinces Public Health Department to the improvement of the drinking-water supplies in villages. Improvement of water supply is among the duties of the district boards, and they spend certain sums annually towards this object. The managements of large estates also spend fairly large sums of money annually towards the construction and improvement of wells within the estates. The Board of Public Health of the United Provinces, which has been entrusted by the local Government with the distribution of the grant for schemes of rural sanitary improvement, gives priority to schemes for improvement of water supply and, in order to spread out the available funds, usually insists upon half the cost of a work being met from local resources. In this way the resources are doubled, and some guarantee is obtained as to the future maintenance of the works. Under the amended United Provinces Village Sanitation Act, the United Provinces Government has framed rules that district officers may make enquiries as to the sufficiency and purity of the water supply in villages and, from funds placed at their disposal by the local Government, may sanction advances for the repair, improvement or construction of wells, provided reasonable security for repayment of the loan is

forthcoming. Such advances are free of interest, and an advance for cleaning and repair of wells is recoverable within a period of two years. In addition, the Public Health Department has endeavoured by bye-laws to secure that wells that may in the future be constructed in country districts conform to certain simple sanitary specifications. It is for individual rural boards to adopt these bye-laws and to enforce them, and all boards in the United Provinces have not yet adopted them. These bye-laws, when adopted, however, are enforced with leniency in view of the cost of construction of sanitary wells in villages

Disposal of House Refuse and Other Wastes.

It is part of the duties of the rural health staff to advise people in the villages :

- (i) To store their manure and refuse in pits outside the villages ; and
- (ii) To construct soakage pits for the reception of house sullage.

A great deal of propaganda has been done for these measures. The economic value of conserving manure in this way and the improvement in its properties that is ensured thereby has been stressed, and the assistance of landowners has been sought as to the provision of space for these pits. While a certain measure of success has been attained, it will be some time before the practice comes to stay among the people. The soak-pits require cleaning up and resetting with fresh brick-bats after a time, and as sweepers, who are by custom the scavengers in India, are not available in every village, and the higher castes are prevented by custom from undertaking menial duties of this kind, this resetting has presented a considerable difficulty.

The question of latrines in villages is a problem by itself. The open fields have been used for purposes of nature by the villager from time immemorial, and, while latrines would be gladly used, the difficulty of getting them cleaned presents the same problem as the resetting of soakage pits. A system which may eliminate sweepers and at the same time may be clean and sanitary is thus the chief desiderata, and this is provided by the bore-hole latrines and the trench-pattern

latrines. Many bore-hole latrines have been constructed in the Partabgarh health unit area. Owing to the breeding of blue-bottle flies (*Chrysomya bezziana*), their further construction was stopped for a time, but a trial is being given again. The trench-pattern latrines consist of a long trench 9 inches wide, alongside of which people have to sit astride for defæcation. The trench is divided into compartments by grass or straw thatch, and the whole structure is surrounded by screens of the same material. When half full, the thatch and screens are shifted to a new trench and the previous one filled up by earth previously taken out from the trench. Owing to the prejudice of the people in even shifting screens, or anything connected with latrines, these latrines have not been popular as a means to suit the permanent needs of the village community. They are suitable in fairs and famine relief camps, where a staff of sweepers can be detailed for duty by the administrative authority.

Campaign against Flies.

Apart from what has been done about educating the people in the use of latrines, and the storage of the village refuse and manure in pits, the Public Health Department has prepared a set of model bye-laws for :

- (i) Regulating the village drainage—i.e., provision of soakage pits ;
- (ii) Regulating the deposit or storage of manure and rubbish and the fouling of village sites ; and
- (iii) Ruined houses.

These bye-laws have not yet been adopted throughout the province, and, where adopted, can only be enforced with a great deal of leniency in the existing circumstances.

IV. NUTRITION.

Composition of Food and Methods of its Preparation.

A survey of the dietary habits of the people in the different provinces of India is proposed to be undertaken shortly in accordance with the wishes of the Government of India, and

important conclusions are expected to be drawn as the result of this enquiry regarding the state of nutrition of the masses. During the last ten years, enquiries on the food intake of the people have been made by officers of the Public Health Department in the United Provinces, and, while ignorance and poverty are the chief factors responsible for ill-balanced diets, the findings of these investigators are that a better balanced diet would not in the aggregate cost much more than an ill-balanced diet, and that what is actually necessary is the revision of the food habits of the people. For instance, milk and milk-products enter very little into the dietary of an average villager in the United Provinces, in spite of ample facilities for grazing that exist in villages. Eggs, meat and fish, which can be had very cheaply in the villages, are shunned by many. Fruits and green vegetables, which can be grown easily by individual cultivators in quantities sufficient for their needs, also enter little into their dietary. Alteration of the nutritional habits of the people is not, however, an easy task. The educative propaganda of the department in this subject is at present confined largely to schools.

From preliminary studies carried out at the Provincial Hygiene Institute a few years ago, it would appear that a fairly well-balanced diet can be provided at a cost varying from Rs. 4 8 annas to Rs. 5 8 annas per month per adult. Such a diet, of course, cannot be expected to be varied and rich in first-class proteins and the protective accessory substances. It furnishes the necessary energy values, *vide* table on the next page.

The allowance for food in the family budgets among the rural population is not known, as this has not been ascertained.

Diet and Health ; Deficiency Diseases.

Beriberi has in the last two years been very prevalent in one of the large towns of the province. No evidence of this has, however, been noticed in the rural areas.

Diet Combinations and Cost.

Diet combinations	Cereals	Pulses ⁴	Fruits and vegetables		Oil	Salt	Spices (turmeric)	Caloric value	Monthly cost	
			Cooked	Un-cooked					Rs. a. p.	Rs. a. p.
A ^{1 2}	Chataks	Chataks	Chataks	Chataks	Tola	Tola	Masha		Rs. a. p.	Rs. a. p.
B ²	Wheat 10-12 Wheat 7-10 and Rice 1-2.5	Dal 2-2.5	4	4	1 ½	1	1 ½	2,566-2,934	4 13 6	to 5 5 6
C ^{1 2}	Wheat 7-12	Dal 2.5	4	4	1 ½	1	1 ½	2,461-2,923	4 15 0	to 5 8 6
D ³	Wheat-Bajra 12	Gram and dal 3-5	4	4	1 ½	1	1 ½	2,530-3,009	4 12 0	to 5 6 0
E ³	Wheat-Bajra 12	Dal 2.5	4	4	1 ½	1	1 ½	2,959-3,022	4 13 6	to 5 3 3
F ³	Wheat-Barley 12	Gram 2 and dal 1	4	4	1 ½	1	1 ½	3,034-3,097	4 11 6	to 5 1 3
G ³	Wheat-Barley 12	Dal 2.5	4	4	1 ½	1	1 ½	2,908-2,926	4 12 3	to 5 3 0
H ³	Wheat-Juar 12	Gram 2 and dal 1	4	4	1 ½	1	1 ½	2,984-3,002	4 10 3	to 5 1 0
I ³	Wheat-Juar 12	Dal 2.5	4	4	1 ½	1	1 ½	2,833-2,905	4 13 0	to 5 3 3
J ³	Wheat-Maize 12	Gram 2 and dal 1	4	4	1 ½	1	1 ½	2,908-2,290	4 11 0	to 5 1 3
K ³	Wheat-Maize 12	Dal 2.5	4	4	1 ½	1	1 ½	2,858-2,912	4 13 0	to 5 3 3
		Gram 2 and dal 1	4	4	1 ½	1	1 ½	2,934-2,988	4 11 0	to 5 1 3

¹ About one chatak to be taken after sprouting by soaking in water for a day.

² The quantity of salt and spices may be *ad libitum*.

³ The proportion of wheat in the cereal mixture should not be less than half.

⁴ The minimum combined weight of pulse and cereal should be 12 ½ chataks

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

General Procedure.

The control of an epidemic of cholera, plague, influenza or malaria in the rural areas requires the active assistance of the village revenue officials, besides the local constabulary and the staff of the rural schools, because the strength of the Public Health Department (sanitary inspectors and vaccinators) in rural areas is far too inadequate to deal with a widespread epidemic. The district magistrate, who is the head of the civil administration in the district, was accordingly made responsible by Government in 1929 for the administrative control of all anti-epidemic measures in the rural areas, so that the requisite co-ordination of the efforts of the different departments may be secured, district medical officers of health being unable, by themselves, to achieve this. On receipt of information of the outbreak of an infectious disease (cholera, plague, influenza or even malaria), district magistrates have now to decide what proportion of the village revenue staff should be spared for epidemic duty and whether the services of the rural school-teachers should also be requisitioned. In actual practice, district magistrates act on the advice of district medical officers of health, but, while the latter also tour the affected areas and organise anti-epidemic measures on their own initiative, they are formally under the orders of district magistrates for all administrative matters connected with control of epidemics.

Staff and Funds provided by Government.

For anti-epidemic measures of all kinds, the United Provinces Government has a staff of twenty-six travelling dispensaries and twelve other medical officers. They are distributed all over the province for general public health duties in normal times ; but, in the event of an epidemic, have to be detailed on investigation of such epidemics, enforcement of anti-epidemic measures and treatment in the areas affected. When necessity arises, this staff has to be augmented by temporary recruitment.

The Government gives cash grants to local authorities for labour required for disinfection of wells and dwellings, the construction of new huts, or for payment to people engaged in guarding the evacuated houses. The Government also meets the cost of all disinfectants, vaccines, quinine and other drugs required for treatment of the people in country districts.

Malaria.

The following table will show the incidence of this disease in the rural areas of the United Provinces :

Average population	Average deaths (1931-1935)	Mortality rate per mille (average for 1931-1935)
44,334,376	783,763.8	17.68

The above figures are undoubtedly exaggerated, as the reporting agency is the village constabulary, who are illiterate ; but assuming that one-fifth only of the recorded mortality from this cause may be correctly ascribed as due to malaria, the approximate true mortality from the disease would be about 150,000 annually in the rural areas of the province.

On the assumption that only about 1% of malarial attacks prove directly fatal, 150,000 deaths from malaria would mean 15,000,000 cases—*i.e.*, approximately one-third of the population of the province.

The problem of rural malaria is complicated in view of the fact that the rural population is scattered over an area of 106,248 square miles in 105,640 villages (an average population of 456 people per square mile and 420 per village) and in view of the poverty and the low standard of living of the masses, the varying habitats and habits of breeding of different anopheline species, and the adverse economic conditions—*e.g.*, poor housing, want of treatment facilities, modes of cultivation and irrigation, flooding and famines, etc.

Methods of Malaria Control.

The only practical measure in rural areas is to make quinine and cinchona products available at the door of the villager for the treatment of actual sufferers. Specific anti-malarial measures

are instituted only in industrial rural colonies and in semi-rural and semi-urban areas, like the “town” or “notified” areas, bigger Panchayat villages, etc., depending on the financial position of the local authority, the nature of the malaria problem, the permanency of the colony, etc.

Economic Aspects of Malaria.

Malaria in the United Provinces is almost constantly present in the autumn (August to November) and spring (March to May) of every year. These two seasons, as is well known, are also the seasons of active agricultural operations, when tilling of land, sowing of crops, harvesting or irrigation are carried out. Thus, there is not only loss of life and impairment of health, but also loss in income due to sick days lost in agriculture. The number of sick days for each attack of malaria may be taken to be ten days, and the loss in earnings at about 3 annas per day. Thus, an agriculturist loses about Rs. 1 14 annas on each attack of malaria, either in wages or in labour.

Sale and Distribution of Quinine and Cinchona.

There is a quinine-tablet manufacturing factory under the control of the malaria branch. This factory obtains raw products from the Bengal Government Quinine plantation and converts these into tablets for sale to the rural masses at cost price.

There is a network of about 2,500 post offices, commanding a big proportion of the rural areas, which sell “treatment packets”, each containing five tablets of 3 grains each—i.e., 15 grains in each packet. The cost of each packet is one anna. Commission of two annas in the rupee is paid to the selling agents. It is the policy of the Government to extend the use of quinine in the rural areas, and the following additional agencies have been entrusted with the sale of tablets on the same lines as post offices : the Agriculture Department and teachers in rural schools.

At the headquarters of each district the Public Health Department maintains a reserve stock of 50 lb. of quinine (or cinchona) under the district medical officer of health (or

the civil surgeon where district medical officers of health have not been appointed). Whenever there is an unusual rise of malaria in the district (which may be judged by the personal observation of the officers) or when the attendance at the rural dispensaries for this disease is double the average for that period of the year (in the past five normal years), the district medical officer of health commences distribution of quinine or cinchona tablets in the areas affected. Nothing is charged for the drug thus supplied to the people. This free distribution is made through the village revenue officials, rural schoolmasters, vaccinators, members of the board, the landowners and their agents, village headmen, the rural constabulary and the staff of the Irrigation, Co-operative and Agriculture Departments working in villages. In addition, the village medicine chests, of which mention has been made on page 363, and of which there are now about 3,100 in the United Provinces, contain a stock of quinine or cinchona tablets, which play an important part in the treatment of malaria. There are also about 3,500 "village aid" dispensaries, which do not, as a rule, contain stocks of quinine, but, in the event of the prevalence of the disease, are utilised for distribution of the drug.

Certain district boards in the province have started a "subsidised" sale scheme for cinchona products. Under this scheme, a complete treatment of 60 grains is sold to the villager for only a portion of the cost price, the balance of the cost being met by the district board concerned. In view of the investment of his own money in purchasing the drug, the villager does not waste it, which he might otherwise do if it were to be supplied entirely free.

Several experiments are being made in the United Provinces in the treatment of malaria by quinine-plasmoquine. In addition, mention may be made of the following schemes for reduction of rural malaria :

(i) *Village Tank Treatment.* — The common village tank and tanks within or adjoining an inhabited area are usually so polluted that carrier anophelines do not generally breed in them. Larger tanks and collections of water at some distance from habitation, with much vegetation and containing purer

water, breed carrier anophelines like *A. culicifacies*, particularly after the rains. The number of such tanks in rural areas is very great and the cost of filling or oiling them would be prohibitive. In semi-rural and semi-urban areas only, where funds are available, are these measures carried out. Introduction of larvæ-eating fish in tanks has been carried out in certain areas and model by-laws to prohibit the netting of fish with nets having a mesh of less than one inch have been circulated by the Government to district boards for adoption with a view to the protection of the smaller fishes and the elimination of the predaceous ones. Like other public health by-laws, these have to be adopted by the different local bodies and enforced by them.

The removal of surface vegetation and floatage from tanks usually following the monsoon periods has been carried out in some parts of the province.

(ii) *Filling in tanks and borrow pits and marshy areas and paris-greening* of breeding-grounds are being carried out in selected groups of villages in the Tarai and Bhabar Government estates, which lie at the foot of the Himalaya hills and are intensely malarious. This has resulted in a marked decrease in the anopheline breeding in these areas.

(iii) *Anti-malarial Measures through the Agency of Boy Scouts and Junior Red Cross Groups.* — Training in the simple principles of malaria control is being carried out in about 127 rural centres through older school-children who may belong to the Boy Scouts or the junior Red Cross groups—e.g., oiling, draining and filling of pools and ditches and the distribution of notices. The value of this step lies in the awakening of popular interest and the education of the people concerning the insanitary practices which are conducive to the spread of malaria in rural areas.

(iv) *Special Training in Malariology.* — This is given every year to medical officers of health and students of the public health classes to enable them to carry out anti-malarial measures in rural areas.

Plague.

The following table will show the incidence of the disease in the rural areas of the United Provinces and the number of anti-plague inoculations performed :

Year	Mortality rate per mille	Number of anti-plague inoculations
Mean for 1921-1925	1.02	49,034
Mean for 1926-1930	0.87	173,863
1931.	0.68	130,880
1932.	0.46	107,351
1933.	0.21	99,983
1934.	0.99	329,959
1935.	0.47	207,991

When a case of plague or suspected plague occurs in a village, the village police-constable has to immediately report the occurrence to the police-station, along with the number of persons attacked and deaths among such persons. The report from the police-station is immediately transmitted to the district medical officer of health and to the district magistrate. The district medical officer of health, on receipt of a report, has to proceed himself to the area affected or depute his assistant or a medical officer of a travelling dispensary to investigate the origin and extent of the outbreak, perform anti-plague inoculations and to administer treatment to actual sufferers. Vaccinators and sanitary inspectors are also deputed for disinfection of dwellings and, when entire villages are affected, villagers are advised to evacuate to the fields. Arrangements in such cases are made by the revenue officers for (i) the construction of new huts for the people to live in and (ii) for watching the property in their old homes. The cost of these measures, as also the cost of anti-plague vaccine and medicines, are met by the Government. The number of anti-plague inoculations is in a very great measure dependent on the state of the epidemic in the year, as people would submit to inoculation only in the actual presence of the disease. Subject to this reservation, inoculations are

comparatively more popular in the eastern districts, where the rural health staff has been in existence for some years, than in other places where this staff has been only recently appointed.

Rat Destruction.

The method of rat destruction with cyanogas fumigation under controlled conditions and skilled supervision is being carried out in some of the endemic centres of the province.

Rat destruction by baiting with barium carbonate is also being carried out in some villages in selected districts.

When the ordinary provisions of the law are found insufficient to prevent the spread of plague, special powers are secured temporarily under the Epidemic Diseases Act (III of 1897) for the stoppage of markets, disinfection of dwellings, inspection of persons travelling by rail or road to specific areas and the segregation in properly equipped huts of persons found to be suffering from the disease.

Ankylostomiasis.

According to a survey carried out in the United Provinces in 1917/18, hookworm disease was found to be extremely prevalent. In view of the shortage of medical men at the time owing to the war, the fact that there was no rural health service, and funds were scarce, all that could be done at the time was to prepare a summary of the recommendations, together with methods of treatment of the disease, and circulate it to the large employers of labour in the province with the advice that the treatment of their employees would mean economic advantage to them. In recent years, posters and pamphlets have been prepared on this disease and lectures and personal talks are given to the people by the rural health staff. Occasional references from jails, mental hospitals and leper asylums, however, show that the incidence of the disease is heavy in certain parts of the province. The number of people treated for this disease in the whole province (urban and rural) in 1934 in medical institutions was only 3,354, which shows that people do not appreciate the importance of treatment.

A hookworm survey in the Partabgarh health unit area was undertaken at the Provincial Hygiene Institute during the years 1933 and 1934.

An average count of 168 eggs per c.c. was found in 2,842 faecal examinations. In view of these results, it was considered that hookworm disease was not a public health problem in the Partabgarh health unit area as a whole, and there was no need for the adoption of general measures of control for this disease in that area.

Tuberculosis.

This disease is undoubtedly prevalent in country districts, but its exact incidence is not known, because mortality from the same is being registered separately only from January 1937.

Pneumonia.

Only 328 deaths were returned from this cause in the whole province in the year 1935, which is very much below the actual incidence of the disease. Under-reporting is due to the inability of the village constabulary to recognise this cause of death, as they are mostly illiterate. No special propaganda has been undertaken in the United Provinces for this disease.

Yaws.

This disease is not common in this part of India.

Leprosy.

The United Provinces branch of the British Empire Leprosy Relief Association was established in 1925 and its work was entrusted to a small committee with the Inspector-General of Civil Hospitals as President and the Director of Public Health, along with others, as a member. A small sum was annually granted by the central body for anti-leprosy work in the United Provinces out of funds collected in pursuance of an appeal made by His Excellency the Viceroy and Governor-General of India in this respect. At first, the United Provinces committee established three clinics at Cawnpore, Benares and Lucknow for the treatment of leprosy on modern lines, which attracted a

large number of leprosy patients. A number of medical men were also sent annually to these clinics for training in modern methods of treatment. After some years' work, however, in pursuance of instructions received from the central body, the United Provinces branch devoted its funds to propaganda work only, leaving the actual treatment to the duly trained private medical practitioners and the medical officers in charge of dispensaries. Accordingly, the United Provinces branch appointed a whole-time leprosy officer for the province in 1931. He was required to tour in the most affected districts of the province, train private medical practitioners and the medical officers of outlying dispensaries in the technique of modern treatment, and induce people by lectures and demonstrations to send leprosy cases for early treatment. While propaganda of this nature has gradually developed, a single officer for the whole province with over 45 million people is far too inadequate to produce measurable results. In 1935, the special leprosy officer employed under the United Provinces branch surveyed 428 villages in one district (Gorakhpur) and sent 407 cases to the out-patients' clinic at the district headquarters, of whom, however, 204 only submitted themselves for treatment. The average attendance at the clinic on weekdays was 131. Seven other out-patients' clinics were opened in the outlying (rural) dispensaries of the same district, while the number of medical men trained, including private practitioners, was ten. In 1936, this officer revisited the infected villages in the same district and induced patients who had ceased attending the leprosy clinics to recommence treatment, and, in consequence of this, 253 new leprosy patients submitted to treatment. He also visited 187 new villages.

Mental Diseases and Drug Addiction.

No work under this head has been undertaken in the rural areas of the United Provinces.

24. NOTES ON HEALTH AND MEDICAL SERVICES,
RURAL RECONSTRUCTION AND NUTRITION
IN DHENKANAL STATE

SUBMITTED BY THE AUTHORITIES OF THE STATE.

Area : 1,463 square miles.
Population : 284,328.

I. HEALTH AND MEDICAL SERVICES.

(1) *Principles governing their Organisation.*

In this State, the medical activities, both preventive and curative, as well as the measures to safeguard and promote public health, are carried out by separate staffs under expert and experienced supervision and control of one central authority. This ensures the thorough and smooth working of both branches. The public health work includes preventive measures against smallpox and cholera (not malaria, leprosy, etc.)—*i.e.*, prophylactic inoculations, chlorination of drinking-water (particularly that of wells) and disinfection of infected dwellings.

In the system of dual control, the staff soon becomes accustomed to its duties and finds ample time to cope with its respective tasks.

As the aim of a medico-public-health organisation of a State is to cure and prevent the spread of diseases among its people as well as among neighbouring States, the best results can be achieved only if there be co-operation in health matters. With this end in view, the State publishes weekly information regarding the outbreak and spread of infectious diseases and the measures adopted to check their spread to neighbouring centres.

Annual conferences would help to solve the various difficult problems that arise from time to time in different centres. Such conferences would create a spirit of co-operation and result in

determined joint efforts being made to solve the various health problems.

In this State, the well-being of the population depends, not only on the work of the medical staff, but also on the co-operation of the people themselves. It also depends on the necessary co-operation of various departments in the State, such as those of Education, Veterinary, Public Works and Finance. This co-operation can best be secured and maintained if the various departments concerned are placed under one portfolio, as is being done in this State.

(2) *Personnel.*

(a) *Doctors.*

The proportion of doctors in rural areas is too small and efforts are being made by the State authorities to distribute doctors in more densely populated parts of the State.

The importance of giving technical training to medical officers has not been overlooked. Special courses of training in tropical medicine, leprosy, antirabic treatment and other subjects are given at Calcutta and Kasauli.

The educational requirements for students entering the medical school are catered for by the English high school.

(b) *Auxiliary Staff.*

Compounders, dressers and nurses assist the doctors in carrying out their daily routine work.

(3) *Curative and Preventive Activities.*

Medical, surgical and prophylactic measures are being gradually applied in rural areas and a network of dispensaries connected with a central hospital is providing medical care at less cost than would otherwise be the case.

(4) *Budgets.*

Expenditure on health and medical services is borne solely by the State. The total population is 284,328 and the expenditure

for the year 1936/37 on public health (vaccination, smallpox) was Rs. 2,818. The State thus spends about two pies *per capita* on public health and thirteen pies *per capita* for medical and curative activities.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Defects of Modern Reforms.

So far, the measures taken by the Government or by public leaders in India for the cultural, social, physical and economic welfare of the villagers have in almost all cases originated from reformers and rarely from the villagers themselves, for whose betterment they have been designed. Their effects have been transient and fitful, mainly due to lack of understanding on the part of the people, on whom rest the practical and ultimate responsibilities for successfully carrying out such measures. To the average illiterate mind, the ultimate benefits of any lofty but compulsory measures are naturally incomprehensible, and such measures are accepted half-heartedly and with distrust.

Need for Co-operation of the Masses.

Any lasting policy will have to be based on the co-operation of the masses, and the first measures must be directed to the improvement of their economic status.

Main Problems of the Masses.

The Indian masses are mainly handicapped by illiteracy, poverty, epidemic diseases, the purdah system, economic exploitation and last, though not least, the social cleavage between the different castes and creeds. Reform must bear all these evils in mind, for isolated efforts in one direction or another usually fail otherwise. These problems confronting the Indian masses can only be solved with the co-operation of the Indian people. This co-operation, in its turn, depends on the

education of the masses, the emancipation of women, breaking down of social barriers and betterment of the economic and physical conditions of the people.

Suggested Measures for Improvement.

Mass Education.

Elementary education for all boys and girls is one of the principal needs. This should be voluntary until it becomes popular, when a compulsory measure should be introduced. Financial assistance should be given to the poorer section of the community in order that no fresh burden should be placed upon it. The education of young persons should include vocational training, while adults should be trained for responsibility and leadership. Compulsory primary education was introduced some years ago, and it has been found that the people have gradually awakened to its utility. Night schools have been opened in all villages under the direction of the village headmen and local school-teachers. Administration of the primary schools has in a large measure been left to the village boards, and the co-education of boys and girls of all castes and creeds without distinction is being undertaken. Agricultural and horticultural training is given to boys and there has been a consequent improvement in methods of cultivation. Physical training is given in the primary schools, where the Boy Scout movement has been introduced with beneficial results. In some of the primary schools, handicrafts and cottage industries, such as bee-keeping, poultry, farming, basket-work, etc., have been initiated and have aroused much interest. In the primary schools, the poorer students have been provided with books, etc., and in some cases financial assistance has been given. This system of education is intensified in the secondary and middle schools of the State, which spends more than one-tenth of its income on education.

Economic Progress.

The main occupation of the average Indian is agriculture. The system of cultivation is crude owing to the small amount of land available for each farmer, whose difficulties include poor

plough cattle, insufficiency of manure and dependence mainly on one crop a year. The average population has no secondary occupation. Communications with the neighbouring markets are inadequate. Measures have been taken to encourage competition and to enlighten the people by holding periodical exhibitions of products of agriculture and industry at different centres of the State and by demonstrating the efficacy of scientific cultivation on economic lines, while trained officers have been engaged in disseminating technical knowledge. This has had a great effect, and during the last decade many new fruits and plants of economic value, once very rare in the State, are now more abundantly produced. Teaching has been given on the preservation of cow-dung in manure-pits and on the cultivation of green manures, such as " Dhndicha " and " Chakunda ". To improve cattle-breeding, stud bulls have been supplied by the State to different places and the experiment has been fairly successful. To prevent subletting and the dividing up of land into too small parcels, it has been made a rule by the State Government that no tenant can sell or transfer a part holding in such a way as to leave his residual holding at less than five acres.

Secondary occupations vary according to locality and convenience. Fishing is a profitable industry in some parts of the State. Hand-spinning and hand-looms are also encouraged. In the central jail of the State, weaving, calico-printing, soap-making and basket-making (cane, bamboo and grass) are taught, and prisoners on their release have become useful citizens. Encouragement is given to improved methods in the breeding of goats. Communications have been improved, arrangements made for a permanent water supply, new roads laid to several market centres and several large irrigation plants have been built with the co-operation of the people. These experiments are growing more popular and the results so far achieved justify the expectation of ultimate success.

Health Education.

Malaria, leprosy, smallpox, cholera, tuberculosis and other diseases are rife among the Indian peasantry and the general insanitary conditions add to the difficulties of treatment. Some

of these diseases demand complete segregation of the patients, and others can be avoided by strict sanitary measures. In the application of these measures, superstition must be overcome, and a great deal of propaganda is being carried out by means of practical demonstrations, pictures, lantern lectures and cinemas. Child mortality is another great problem requiring study, and the Indian peasantry needs enlightenment and practical help in this direction. Inoculation against smallpox and cholera used to be compulsory, but at present there is a popular demand for it. Treatment is given to lepers and steps are taken for their segregation. The people do not fully co-operate in this, involving as it does disturbance of domestic and social intercourse. With the growth of culture, these measures will be more readily accepted. As regards malaria, quinine is distributed at different centres. The campaign against mosquitoes has been found to be unworkable. A better though more costly remedy is to be found in the filling in of ditches and sources of impure water. Health propaganda has been carried out, but the general living conditions of the people must be substantially changed before any such propaganda can take effect. Training in midwifery is being given, and the results of this experiment are being awaited. The people are being encouraged to build their houses in accordance with modern sanitary requirements and to construct cattle-sheds at an appreciable distance from dwellings. Villagers are instructed to maintain common pits for the storage of refuse. A number of wells and reservoirs for water are provided in every village for common use. "First-aid" instruction is given to adults in the interior at the same time as it is given to the scouts in the villages.

Purdah.

This system, strictly observed by certain classes of Hindus and Mohammedans, adversely affects the health of women. Its abolition can only come with a rise in the cultural level of the population. It is unpopular amongst the educated classes.

Social Distinctions.

Many attempts are being made by modern reformers to bridge the gulf between Hindus and Mohammedans and the caste

Hindus and the untouchables. Apart from such direct efforts, modern methods of communication tend to eliminate these differences, but in every Indian village this problem hampers progress. Joint education of students of all classes and creeds is being undertaken. The State convenes meetings of the "untouchables" for the purpose of discussing ways and means of raising their standard of life and of persuading them to give up certain undesirable habits for which the caste Hindus have an inherent dislike. Meeting-rooms have been provided in all the villages, and there all villagers, high and low, congregate every evening on return from work to receive religious instruction and to decide on problems affecting the village. This system has been found by experience to bring the different castes nearer together. Here, too, improvement will follow education.

The Co-operative Loan System.

The Indian peasants are heavily in debt to the money-lenders, the Mahajans. In few places is there a co-operative loan system providing money at a fair rate of interest. In this State, as elsewhere, the maximum rate of interest payable by a debtor has been limited by law and takavi loans are granted at a low rate of interest ; but that does not sufficiently solve the difficulty. The success of the co-operative loan system depends on the efficient working of its constituent societies and so, indirectly, on mass education. In the absence of efficient and well-organised co-operative societies, any large-scale plans for the rural population can be but few and far between.

III. SANITATION AND SANITARY ENGINEERING.

(I) *Housing.*

The rural population lives for the most part in mud-built houses with thatched roofs. This form of roofing ensures adequate ventilation all the year round. Such housing is cheap and quickly built, the only disadvantage being the risk of fire. Periodical plastering of the walls and floor keeps the houses clean

and free from insects. The annual replacement of the straw of the roofs has the effect of allowing the sunlight to penetrate to the interior of the rooms and disinfecting them.

(2) *Water Supply.*

Wells are the principal source of water supply in rural areas ; other sources are ponds and streams.

(3) *Disposal of House Refuse and Other Wastes.*

Latrines are only to be found in towns. The lack of such provision in rural areas is an important factor in the spread of such infectious diseases as cholera, dysentery, typhoid, etc.

(4) *Campaign against Flies.*

In this direction, very little has been done. Heaps of manure, the breeding-grounds of flies, may still be found in front of houses in rural areas, though this is strictly forbidden.

IV. NUTRITION.

(1) *Composition of Food and Methods of its Preparation.*

Rice is the staple food. Pulses are not eaten to any great extent and the diet contains a greater proportion of carbohydrates than of proteins and fats.

(2) *Nutritive Value of the Principal Foods peculiar to the East.*

The starchy foods eaten give sufficient energy and heat, the caloric value of the starch being greater than that of meat.

(3) *Minimum Cost of Adequate Nutrition and Allowance for Food in Family Budget.*

If prisoners' diet be taken as the standard for rural people, the minimum cost for adequate nutrition is one anna per meal. No estimate can be made of the minimum allowance for food in the family budget.

(4) *Diet and Health: Deficiency Diseases.*

As our people consume too much starch in their diet, they are easily prone to such deficiency diseases as beriberi and epidemic dropsy.

(V) MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

(1) *Malaria.*

Since railways were introduced in the State, malaria has slowly spread to the interior and has secured a foothold in various centres. Up till now, nothing has been done as regards the destruction of mosquitoes or of their breeding-grounds.

(2) *Plague.*

This disease has never been seen in the State.

(3) *Ankylostomiasis.*

This is not a prevalent disease in the State.

(4) *Tuberculosis.*

This disease is very rare in the rural districts.

(5) *Pneumonia.*

This disease is rare.

(6) *Yaws.*

This is not seen in the State.

(7) *Leprosy.*

This disease is gradually spreading to rural areas. A scheme for its thorough survey and modern scientific treatment, paying particular attention to the question of segregation of lepers in their own villages, has been submitted and approved by the State authorities.

(8) *Mental Diseases and Drug Addiction.*

Mental disease is very rare in the State. Syphilis, its main cause, is uncommon.

There is a great deal of addiction to opium and its preparations in rural districts.

25. NOTE ON HEALTH AND MEDICAL SERVICES
IN H. E. H. THE NIZAM'S DOMINIONS
(HYDERABAD STATE),

by

C. F. CHENOY,

for the Director, Medical and Public Health Department.

Area : 82,698 square miles.

Population : 14,436,148.

I. HEALTH AND MEDICAL SERVICES.

Principles governing their Organisation.

The Medical and Public Health Organisation is in the hands of the Director, Medical and Public Health Department, who is also the Plague Commissioner for the city and suburbs of Hyderabad and adviser to the Government in all major schemes connected with sanitation and rural uplift. He is assisted by a Deputy Director of Public Health in the public health section, and by a Deputy Director of Medical Services on the medical side.

In the fifteen districts he is assisted by fifteen civil surgeons, who are also the district health officers. Each civil surgeon is assisted by two assistant surgeons (one an assistant health officer and the other the assistant surgeon in charge of the medical side). Thus it will be observed that collaboration of the two parallel services is assured.

The Health Department's duty is general supervision and control over the whole sanitary services throughout the Dominions.

Personnel.

(a) *Doctors.*

There are in the State, on the medical side of the service, one Director, one Deputy Director, 33 civil surgeons (including 15 who are also district health officers), 57 assistant surgeons, and 186 sub-assistant surgeons, including women doctors. On the

health side, there is one Director with a Deputy Director of Public Health, 15 civil surgeons (district health officers), 16 assistant health officers, 17 health inspectors, 58 health sub-inspectors, 15 deputy inspectors of vaccination, 131 vaccinators, 1 special plague officer with 3 assistant surgeons and 3 sub-assistant surgeons, 8 health inspectors and 15 sub-inspectors, and health camp staff consisting of 1 overseer and 2 sub-overseers, 1 chief malaria officer with 1 assistant surgeon, 2 sub-assistant surgeons, and 10 health sub-inspectors.

The medical sanitary staff is small in proportion to the population. Gradual expansion is in progress. At present, the economic position does not justify any extensive expansion. With careful distribution and supervision, excellent results are being obtained.

The cadre of civil surgeons consists of doctors with British experience and qualifications in addition to degrees of Indian universities.

(b) *Auxiliary Staff.*

At present, the auxiliary staff consists chiefly of nurses, ward-boys, midwives and dais. In the districts, no outlying work of the dispensaries is carried out by nurses, except in a few mission hospitals. A midwife or dai and at least one ward-boy is attached to every hospital or dispensary.

Curative and Preventive Activities.

Steps are taken to penetrate all areas on medical, surgical and prophylactic work. In the district there is a District Central Hospital with a chain of dependent dispensaries in rural areas. In the Public Health Service the district health officer (civil surgeon) is in charge of the whole district ; his assistant health officer is a qualified man, holding a diploma of D.P.H. or D.T.M., who tours every month and checks the work of the subordinate staff. The whole is supervised by the district health officer. The district health officer is expected to tour regularly throughout his district, controlling and inspecting the work of the health staff, making proposals for the improvement of the water supply, drainage and food. He is responsible for the

control of all epidemic diseases and arrangements for prevention ; he directs the activities of the health inspectors and vaccinators.

The whole work of the Dominion is checked and inspected by the Deputy Director of Public Health. He is expected to tour freely and regularly throughout the Dominions with a view to co-ordinate activities and keep in personal touch with officials of other departments. He gives advice on sanitary schemes, inspecting the works actually in progress and generally giving practical effect to knowledge and experience acquired in different districts. He submits his reports to the Director, Medical Department, and works under his guidance and orders.

Budget.

The budget sanctioned by the Government on the medical side consists of Rs. 22,67,158 and on the public health side consists of Rs. 3,92,306. The Medical and Public Health Department also gets an amount from the local fund income, which varies each year. In 1936 (1346 F.), the amount due to the Medical Department was Rs. 3,07,203, but, of this, more than two-thirds was allotted to the indigenous system of treatment (Unani and Ayurvedic).

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

In the Public Health Department, the method advocated to ensure co-operation of the people is limited to persuasion and propaganda. Only in cases of emergency, such as outbreaks of epidemic disease, some compulsion is introduced when persuasion fails. It is generally found that assistance from the people can be obtained where popular instruction is undertaken. Pamphlets, posters, magic-lantern lectures, house-to-house talks, and particularly the cinema car, all tend to create a helpful public opinion.

The cinema car tours throughout the districts in rotation, educating the public by means of films on plague, malaria, leprosy, cholera and by means of slides and lectures in the local languages (Urdu, Telugu, Marathi and Kanarese).

The car is accompanied by a medical officer with a travelling dispensary, who gives lectures and treats the people. In this way, people are able to grasp the real significance of better sanitation and cleanliness. During work, special attention is paid to instructing children, and especially the children at school. A small book on common infectious diseases, published by the Public Health Department, is in use in the schools.

Rural reconstruction is undertaken by means of town-planning and village improvement, which is ably assisted by the Revenue, Veterinary, Agricultural and Education Departments. The Co-operative Department also plays its part in this rural reconstruction. The main aim is to improve the health of the masses and to stop the spread of epidemics. Improvement is evident and a committee is to be inaugurated in this connection. Town-planning and conservancy, the improvement of wells, manure pits and village drainage, together with anti-malaria measures, are receiving special attention.

III. SANITATION AND SANITARY ENGINEERING.

The problem of drinking-water supply has been ably tackled by the Water Board and now nearly every district headquarters town has a pure water supply. This scheme is gradually being extended to the Taluqs and important towns as funds are available. Experiments regarding village water supplies are in progress.

The question of housing is also separately dealt with. Building rules and regulations have been accepted by the Government and are now in force.

The cleanliness of towns is, as far as scavenging and drainage work is concerned, receiving attention, and the drainage system of most of the district headquarters towns has been improved on the advice of this department, under the direction of the divisional engineer, local funds.

Incinerators and improved conservancy are effective in reducing the fly nuisance.

A new type of latrine has been devised ; it is built over two tanks (anærobic and ærobic). The system is cheap and very efficient. With the minimum of added water, faecal matter is

completely digested, giving a small, clear effluent quite free of smell. The problem of removal and disposal disappears and the system is eminently suitable for villages and institutions where a sewage system is not available. This type of latrine is called the “Aqua Privy Hyderabad Pattern”.

Special designs for markets, slaughter-houses, wells and weekly bazaar platforms have been issued with the approval of Government. On these designs, construction is taking place throughout the rural areas.

Medical inspection of schools was started last year and considerable work has been done in this direction.

Two special departments for the control of plague and malaria are in existence. Scientific surveys have been made in many places and campaigns inaugurated with marked success.

IV. NUTRITION.

Outside Government institutions, no special work has been done. In towns, regular inspection of food supplies are undertaken, but in villages little is possible at this stage. The general nutrition of the people is good ; deficiency diseases are rare.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

This is divided into anti-malarial measures for the City of Hyderabad and in the districts. The aim is to break the cycle of infection in two ways by the destruction of mosquito larvæ and by attacks on the parasites in man. Both methods are used extensively here, the former being preferred as giving more certain results. The conditions and causes underlying the prevalence of malaria vary in different parts of the dominions and no one anti-malarial measure is suitable for all.

In anti-larval operations it is not necessary to abolish all breeding-grounds and mosquitoes. A marked amelioration in

health follows if the more important breeding-grounds of malaria-carrying mosquitoes are controlled.

Careful surveys are of the utmost importance and have brought to light important factors on which anti-larval operations are organised among the civil population and over a wide and infected area. House-to-house distribution of plasmoquin was tried in an attempt to sterilise the carriers ; the results were carefully checked and were disappointing. The incidence of malaria showed no great reduction and the curative effect was negligible. Better results are to be expected in dealing with the inmates of an institution under discipline, but the method is unsatisfactory among the general population. Efforts are made to educate the public in the use of quinine, and the sale of quinine by post offices and thanas in districts is encouraged. Free quinine is given at the dispensaries and hospitals and also by touring officers.

Permanent clearing of waterways is an important factor. Activities in this direction include sloping and straightening of banks, clearing of hyacinth and water weeds and stocking with larvæcidal fish.

Plague.

Hyderabad City and many of the districts have been subject to recurring epidemics of plague. Each epidemic lasts about nine months in a year, disappearing in the hot, dry season. A special Plague Department was inaugurated some six years ago to combat the epidemic in the City of Hyderabad. Later on, surveys were made in the districts and it was found that two endemic centres existed where plague persisted throughout the year. It was from these centres that recrudescence occurred in other areas. Well-directed efforts of rat destruction in the endemic areas and in the city have effected a very marked reduction of plague.

In the endemic centres plague survives even in the non-epidemic period, breaking out in virulent form when meteorological conditions are favourable. In such localities, organised schemes of rat destruction were carried out during the hot weather before the commencement of the ordinary epidemic period. The methods of rat destruction in use are as follow, and

these procedures are continuous throughout the year in the city :

- (a) The systematic use of poison baits ;
- (b) Fumigation of all rat-holes with calcide and closing the rat-holes ;
- (c) Trapping.

In the city, every rat caught in a trap is dissected and examined in the laboratory.

Rat density, flea index and meteorological reports, particularly the mean temperature and the saturation deficiency, are carefully charted and the relation of these factors to plague incidence noted and recorded. During epidemics, in addition to these measures, disinfection, evacuation and inoculation are carried out. In every infected locality, fumigation and closing of rat-holes is extended to 200 yards round the infected house. The City Improvement Board is gradually building rat-proof dwellings. Shortly, rat-proof grain godowns (Gunj) will replace the old type of building so open to attacks by rats.

In the districts, during epidemics, disinfection, evacuation and inoculation are carried out and human migration to non-infected areas is, as far as possible, controlled.

The conclusion of many years' experience is that plague is almost invariably carried from place to place by fleas carried in the personal effects of migrants ; also, that inoculation is the most important measure of personal protection.

Ankylostomiasis.

In the dominions, very few cases of ankylostomiasis are found, a few are imported from Madras Presidency.

Tuberculosis.

Tuberculosis is very prevalent in Hyderabad and the larger towns of the dominion. A very large proportion are cases of tuberculosis of the lung. The mortality is considerable, though no accurate figures are yet available. The main cause of the disease is bad housing with want of light and ventilation in congested areas. Indian cattle are not commonly infected with this disease and very few Indians drink milk unboiled.

At present, the organisation to combat tuberculosis is gradually developing. So far, two special out-patient clinics—a ward at the Osmania Hospital and a special section of the Isolation Hospital—are used for tuberculosis cases, all supported by the Government. The Medical Department has submitted a scheme to combat tuberculosis which will shortly be brought into effect. The proposals include an up-to-date sanatorium with 120 beds.

There is no separate tuberculosis service in the Medical and Public Health Administration of Hyderabad State. Doctors are sent for training to Madanpalli sanatorium in South India and to the All-India Institute of Public Health and Hygiene.

Pneumonia.

Cases of pneumonia occur throughout the year, but are more common during the cold season.

Yaws.

This disease was discovered only last year among aboriginal people in the jungles of Warangal and Karimnagar districts. It is found in the deeper parts of the jungles. Close investigation has convinced us that it is communicated only by direct contact. Treatment is being provided and further investigations are continuing.

Leprosy.

Leprosy is common and very prevalent in three of our districts. There is a Mission Hospital at Dichpalli, where over 700 lepers are always under treatment. The hospital is generously aided by the Government and the results achieved are very creditable ; last year 557 were discharged as “symptom free”.

Mental Diseases and Drug Addiction.

There is a mental hospital in which cases of all mental diseases are treated.

Indian hemp is rarely used in Hyderabad, and, though the use of opium is fairly common, drug addiction is not an important factor in the mental hospital figures.

26. NOTE ON MEDICAL AND PUBLIC HEALTH ORGANISATION IN MYSORE STATE,

by

Dr. P. PARTHASARATHI,
Director of Public Health.

Area : 29,469 square miles.
Population : 6,557,302.

I. ORGANISATION OF THE MEDICAL DEPARTMENT.

The Senior Surgeon is the Chief Adviser to the Government on medical matters and the chief administrative authority of the Medical Department. Each district is administered by a medical officer of the status of a surgeon, who is directly in charge of the district headquarters hospital, controls all medical institutions, and is responsible for all medical work in the district.

The majority of dispensaries—urban as well as rural—have indoor accommodation for emergency cases.

The direction of the larger hospitals is in the hands of officers with university qualifications and the smaller dispensaries are manned by sub-assistant surgeons, from among whom the assistants in the larger institutions are also drawn. The staff of special hospitals or the various special departments in major institutions is recruited from officers who have received an intensive foreign course of training in the subject concerned.

Women and children are treated at all general State medical institutions. In addition, special hospitals for women and children are available at all district headquarters. Smaller dispensaries for women, with maternities attached in most cases, are provided in a few of the larger towns other than district headquarters.

The number of institutions has rapidly risen, there were 99 in 1890, there are now (1935) 281; 47,475 in-patients and 4,494,006 out-patients were treated in 1935.

As their number at present stands, medical institutions are, on an average, situated within a range of six miles of each other.

A policy of further expansion and improvement of medical aid is being steadily pursued in the State, the programme falling under the following headings :

- (1) Establishment of new dispensaries ;
- (2) Opening of special dispensaries ;
- (3) Construction of new maternities ;
- (4) Improvement of, and expansion of the scope of, work in existing institutions ;
- (5) Extension of medical aid in rural areas through subsidised practitioners ;
- (6) Construction of maternity homes as adjuncts to existing dispensaries or as independent institutions for admission and care of obstetrical cases.

It may be mentioned that there are two types of dispensaries : (1) the local fund dispensaries, maintained jointly by the Government and the local bodies, and (2) the district board dispensaries, the cost of which is met entirely by the said boards. The latter are new dispensaries provisionally established by the district boards, on their own initiative and with the approval of the Government, for eventual conversion into regular local fund dispensaries. In the case of local fund dispensaries, supplies of European medicines and the doctor's emoluments are usually paid by the Government, whilst the balance of expenditure is met either by the district board alone or, in some places, by the district board and the local municipality in the proportions of 2 to 1. In the case of the district board dispensaries, the whole of the outlay, including the cost of European medicines and the doctor's salary, is met by the district board.

A notable feature in connection with the progress of medical aid is the large measure of support received from the public in the shape of generous donations for medical buildings. The out-patient departments of the Victoria and the Krishna-rajendra Hospitals, the new maternity and children's hospitals in Bangalore, the general hospitals in Chickmaglur, Hassan and Shimoga, as well as a similar hospital now under construction in Kolar, beside numerous smaller buildings for maternities and local fund dispensaries, have been erected with the liberal

voluntary contributions that are periodically obtained from the public. It may be mentioned here that, during the past ten years, a sum of Rs. 10 lakhs has been received in the form of donations from philanthropists.

A university medical school for training sub-assistant surgeons is attached to the Victoria Hospital in Bangalore City.

A university medical college is attached to the premier hospital of Mysore City, the Krishnarajendra Hospital and the medical officer in charge is *ex-officio* principal of the college.

The State provides and maintains the following special institutions :

	Number of beds
(1) The Princess Krishnajammanni Sanatorium, Mysore (in-patient and out-patient departments)	98
(2) Tuberculosis Dispensary, Mysore (out-patient department only)	—
(3) Epidemic Diseases Hospitals, Bangalore, Mysore and Kolar Goldfields (in-patient and out-patient departments)	128
(4) Mental Diseases Hospital, Bangalore (in- patient and out-patient departments) . .	165
(5) Leper Hospital and Asylum, Bangalore (in- patient and out-patient departments) . .	62

An up-to-date and well-designed building for the mental hospital is under construction.

Budget.

The annual outlay on the Medical Department is approximately as follows :

	Rs.
(1) Superintendence	32,800
(2) Hospitals and dispensaries	13,87,400
(3) Medical Stores, Bangalore	1,99,900
(4) Mental Hospital, Bangalore	35,000
(5) Medical School, Bangalore (scholarships and special charges)	13,500
Total	16,68,900

Against this, the recoveries from local bodies towards the recurring maintenance charges of local fund dispensaries total Rs. 2,45,000.

II. HEALTH AND MEDICAL SERVICES.

The Mysore State divides naturally into two separate regions, each of which has well-marked and distinctive features, the *malnad* (or the hilly tract), magnificent hill and forest land, and the *maidan*, or open country. The population per square mile is 203, the *malnad* being sparsely populated as compared with the *maidan*, the mean densities in the two divisions being 223 and 149 respectively.

For purposes of administration, the State is divided into eight districts.

The Mysore State Department of Health was permanently constituted in 1929 as a separate department under the Director of Health.

The agencies responsible for health activities are the Central Department of Health, the district boards, city and town municipalities and rural health organisations. The local bodies are primarily responsible for carrying on health work in their respective jurisdictions, in accordance with the provisions of the District Board, Municipal and Village Panchayat Regulations.

Central Department of Health.

For convenience and despatch in dealing with the work, the Central Department of Health has been divided into eight Bureaux with duties defined as follows : administration ; epidemiology and communicable diseases ; laboratories ; vital statistics ; health education ; sanitary engineering ; rural health ; maternity and child welfare.

District Boards.

The president of the district board, as the executive head for the district, is assisted in all sanitary matters by the district health officer with a staff of sanitary inspectors and vaccinators. In Mysore and Shimoga districts, the district health officer is

a full-time officer, whilst in the remaining six districts the district medical officer acts as health officer as well.

All health work in the district is referred to the Health Committee, the district health officer acting as adviser on all health matters. Control of epidemic diseases is organised with the help of the staff and with the co-operation of the medical officers of dispensaries situated in the district. These latter officers carry out the preventive inoculation work in their areas under the general supervision of the district health officer.

The duties of the sanitary inspectors consist of epidemic duty, supervision of vaccination, inspection of hotels, markets, fairs, slaughter-houses, etc., and, in general, looking after the sanitation in the villages. In addition to these, however, the sanitary inspectors are employed on minor engineering work undertaken by the district boards and also in the collection of tolls.

It will be seen that the department co-ordinates all the health work done in the State. For this reason the appointment and transfers of health officers are made by the Government on the recommendations of the Director of Health. The sanitary inspectors are selected and appointed by the Director, who also controls transfers. The vaccinators, who are at present engaged direct by the presidents of district boards, are selected out of a list of qualified vaccinators maintained by the department. Transfers of such officers are effected in consultation with and on the recommendation of the presidents of district boards.

Maternity and Child Welfare.

One lady doctor trained in maternity and child welfare work has been appointed to organise maternity and child welfare centres. There are at present seventeen centres in the State.

Rural Health Work.

The Bureau of Rural Health has supervision over, reports upon and organises the rural health administration of the State. A group of 180 villages has been selected in Mandya Taluk with a view to carrying out experimental measures of sanitation. The staff consists of one health officer (third class), one sanitary

inspector, two assistant sanitary inspectors, two midwives and one vaccinator.

With the co-operation of the Rockefeller Foundation, more intensive rural activity has recently been started in *Closepet Health Unit* for a rural population of about 40,000. The staff consists of one second-class health officer, one third-class health officer, five public health nurses, ten midwives and five vaccinators. The unit serves also as a training centre for the staff required for public health work.

The *vaccination* work rests with the local bodies, and the department not only supplies the vaccine lymph prepared by the department, but supervises the work of vaccination all over the State, both of the vaccination staff and of the medical staff in charge of dispensaries.

Under the Vaccination Regulations, any local body can, if it desires, have vaccination made compulsory in its area, subject to the previous approval of the Government. The regulations are in force in all municipalities, in the rural areas of Shimoga district and parts of Kadur, Hassan, Kolar and Bangalore districts. An endeavour is being made to render vaccination compulsory in the entire State.

Preparation of Vaccines.

Sufficient vaccine lymph for the whole State is manufactured at the Vaccine Institute. Anti-typhoid and anti-cholera vaccine are now being prepared at the Public Health Institute and attempts are being made for preparing plague vaccine also.

Propaganda.

As an important part of public health propaganda, fourteen films on the following subjects are being demonstrated at various centres and explained clearly to the audience in the vernacular :

1. Malaria.
2. Hookworm.
3. Venereal diseases (for men).
4. How disease is spread (tuberculosis).

5. How to prevent disease (general).
6. One scar or many (value of vaccination).
7. Rat menace.
8. "Fly" as a disease-carrier.
9. The knowing gnome.
10. In his father's footsteps (rural sanitation).
11. The long *versus* the short haul (value of mother's milk).
12. Social hygiene (for women).
13. Jinks (a comic picture to show the value of fresh air, daily bath, good exercise and wholesome food).
14. Leprosy.

Posters and leaflets on health subjects are printed and distributed.

A health journal, "*Mysore Arogya*", is also published once every quarter.

Budget.

Amounts spent during 1935/36 by the different agencies that are attending to the public health needs of the State are as follow :

	Rs.
Public Health Department (1935/36)	2,66,000
Town municipalities during the calendar year 1936 (probable amount spent)	3,38,000
City municipalities during the calendar year 1936 (probable amount spent)	2,79,000
District boards during the year 1935/36 (probable amount spent)	2,12,056

In addition, there are two non-official bodies, the Gunamba Trust, which provides money for maternity and child welfare activities, and the Red Cross Society. During the year 1935 the Gunamba Trust spent Rs. 6,608 and the Red Cross Society Rs. 9,251.

III. RURAL RECONSTRUCTION.

Under a Government Order, about twenty villages in each district have been selected for intensive rural reconstruction work, to raise the standards in the field of health, agriculture, education and public economy.

IV. SANITATION.

The department prepares schemes, plans and estimates, advises and, where necessary, executes the work on drainage and water supply. Plans and estimates are also made for city improvement and extensions and housing schemes.

A supply of water is also provided in rural areas by means of bore-wells wherever possible.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria.

In rural areas, anti-malaria work is conducted in three centres, each having a third-class health officer, two assistant sanitary inspectors and fieldmen all trained specially for this work. In the Irwin Canal Zone, on account of the prevalence of malaria due to irrigation, a control area forming a group of ten villages has been started with a third-class health officer, one assistant sanitary inspector and fieldmen.

Plans and estimates are now being prepared for the experimental control of malaria in three villages by means of permanent engineering works.

In particularly affected areas in the *malnad* regions of the State, special grants are made by Government for free quinine distribution.

For purposes of epidemiological study, the malaria problem of the State can be classified under three district headings—viz :

- (1) Malaria in the plains, associated with the irrigation system ;
- (2) Malaria in the foothills, as in the Kadur, Shimoga and Hassan districts, associated generally with running streams ;
- (3) Malaria in the dry districts of Chitaldrug, Kolar, and Tumkur associated with human interference with the natural lines of drainage, or what is popularly understood as man-made malaria.

A malaria study station has been established in each of the above areas to study its special problems—*i.e.*, at Nagenhalli, in Mysore district; at Mudigere, in Kadur district, and at Hiriyur, in Chitaldrug district. The results of their work have been discussed in “Notes on Malaria in Mysore State”, Parts I & II, SWEET, W.C., *Rec. Mal. Survey of India*, Vol. III, No. 4, December 1933; SWEET and RAO (1930), NURSINGH, RAO and SWEET (1934). Apparently *A. culicifacies* and *A. fluviatilis* are the important malaria transmitters in the rural areas of Mysore; *A. stephensi* and *A. varuna* may be minor carriers.

Findings in respect of gland infections showed that in the Nagenhalli area, *A. culicifacies* transmits malaria in the March to June season and that *A. fluviatilis* plays this rôle in the autumn months of the year. In the Mudigere area, though *A. jeyporiensis* is the dominant species, the evidence showed that it played no part in the local malaria problem. It was found that *A. fluviatilis* is the chief carrier in this area, and that the transmission season is between March and July. In the Hiriyur area, there is definite evidence of a malaria transmission season in the later months of the year, *A. culicifacies* and *A. fluviatilis* being the carriers.

Malaria Control.

It has been found that a 1% paris green mixture is amply sufficient to control anopheline breeding, not only in swamps and marshes, but also in irrigation channels and small streams. *A. culicifacies* and *A. fluviatilis* both breed in channels and the margins and sandy pools of the streams, and the results of spraying with a 1% mixture have been uniformly satisfactory.

At the beginning of control work in the Nagenhalli area, the question of the necessity of spraying paddy fields with the paris green mixture arose immediately. In this area, the greater part of the acreage is under paddy cultivation from July to January. The planting begins in June, and by September the paddy is well grown. It is between these months that most of the paddy-field breeding of anophelines occurs. Only a fraction of all the anopheline larvæ found in the paddy fields are of the dangerous species. Since, moreover, the most intense breeding of paddy-field larvæ is in “off months” so far as malaria

is concerned, and the acreage to be sprayed would be considerable, no attempt is made to control paddy-field breeding. The results of experimental work since 1930 have shown that malaria in this area can be successfully controlled without spraying paddy fields.

Experimental work in the study station at Mudigere has shown that it is possible to control malaria whilst limiting the antilarval work to about seven months in the year, from December to about the middle of June, when the regular monsoon breaks. The paris green spraying is started in December immediately *A. fluviatilis* larvæ begin to appear in the streams and channels.

Since progress in these stations was reported in 1933, further work has been continued and carefully controlled experiments in practical measures against rural malaria have been started in a village near Nagenhalli. A further reduction of the depth of the mosquito-control zone from half-a-mile to a quarter of a mile was tried as an experiment in the Nagenhalli malaria station without any apparent adverse effect on the spleen and parasite rates.

A zone of a quarter of a mile from the periphery of each village seems to be the minimum for a reasonable degree of malaria control. On this basis, malaria control in a group of ten villages was started in 1935 with the minimum field and central staff so as to reduce *per capita* costs to a figure that would encourage village units to undertake their own malaria control. The experiment is still in progress and no definite statements are yet possible.

Drug Sanitation.

Experiments on the prophylactic value of plasmoquine and atebirin have been conducted in small village units and the findings have been published in the *Records of the Malaria Survey of India*.

Biological Control.

Gambusia, the larvœcidal fish largely used in some parts of Italy, imported into the State in 1928, has become completely acclimatised to local conditions and is mainly relied upon for

the control of *A. stephensi* in urban areas, where they are used in wells, which, however, require restocking every six to eight months. They effectively keep down *A. stephensi* breeding in wells which are kept clear of all surface débris or vegetation, but are almost useless unless this is done. All the tanks in the Irwin Canal area, which has recently become hyperendemic, have been stocked with this fish, but it is of doubtful value in controlling the multiplication of anopheles.

Experiments on *herbage cover* have just been started, but no useful information is yet available.

Anti-malaria Engineering.

Years of propaganda and work in close contact with the officers of the Irrigation Department has now had the effect of making the people of Mysore State malaria-minded. Schemes are under preparation for different methods of treating irrigation channels in such a way as to keep down anopheline breeding. An automatic siphon for flooding waste weir valleys which are properly graded for the purpose has been designed and is very promising.

Plague.

Mysore State was first invaded in August 1898. The first case of plague—that of a railway passenger from Hubli—occurred in Bangalore City. Deaths from plague have continued to occur since this date.

From a study of figures available since 1906 (J. V. KARVE and E. R. SUNDARARAJAN, 1935) it may be inferred that the incidence of the disease follows a more or less regular five- to seven-year cycle. The plague season lasts, roughly speaking, from July to December in the State, the period January to June being more or less quiescent.

If we define endemicity as the occurrence of more than two or three deaths a year in a village with a population of 500, the disease may be said to be endemic in thirty-seven out of eighty taluks in the State. One of the taluks has a plague death rate of nil, while ten others have a death rate less than 0.1 per mille of population and many of the taluks on the border of the State are free, except in the far corners. These areas

are those along (1) the border of Honnali, Harihar (Sub), Davangere and Jagalur taluks ; (2) the border all round Mysore district ; (3) the Anekal Taluk border, and (4) along the border of Chinthamani Taluk.

Control Measures.

Reliance is chiefly placed on protective inoculation. The vaccine is obtained from Haffkine Institute and is fairly popular amongst the public as a protective measure.

Evacuation of the village immediately following a rat-fall is recommended as soon as there is evidence of an abnormal rat mortality. The advantages of evacuation are more often than not negatived by the delay in vacating the houses, the proximity of the camps, and the invariable practice of carrying objectionable material likely to harbour rats and fleas to the sheds. There is no legal provision for the enforcement of evacuation of villages and it is purely voluntary.

In towns and cities where there is a regular health staff, the infected houses are periodically disinfected, usually with a kerosine-oil emulsion. Opening up of roofs of infected houses for the deratisation of the house-tops and disinfection by the sun's rays is not generally practised.

Rat-catching with baits is practised only in very few of the larger municipalities, and even in these it is not continued with sufficient persistence to produce any appreciable effect. Regular rat destruction by the use of cyanogas is now under trial in the newly-opened health centre at Closepet.

Isolation hospitals for the treatment of the sick are provided in the larger municipalities, but isolation of all cases in these institutions is not enforced by law.

Hookworm.

A detailed survey of hookworm and other helminth infections in the State was carried out in 1927/28 ; 11,927 persons were examined ; 7,109, or 59.4%, were found to be infected with hookworm. The degree of infection by districts varied from 14.5% to 85%. The incidence may be roughly classified into three groups—light in the Chitaldrug district, moderate in

the Kolar, Bangalore, Tumkur and Mysore districts, and heavy in the Shimoga, Kadur and Hassan districts.

The incidence of *Ascaris lumbricoides* in the whole survey was 35.2%.

Information as to the intensity of infection, was obtained by means of egg counts. The intensity of hookworm infection as represented by district averages is low, being only 1,000 eggs per c.c. per person examined. As regards the necessity for control measures, the Kolar, Bangalore, Tumkur and Chitaldrug districts were disregarded, the counts being 300, 500, 300 and 100 respectively. The hookworm problem was therefore confined to the other four districts—namely, Shimoga, Hassan, Kadur and Mysore—and systematic control measures started in this area.

The four districts where hookworm disease was found to be a health problem lie in the western part of the State, where the country is mostly hilly. The population in this area is roughly divided into the strictly rural, distributed in small and widely scattered villages, and a highly concentrated plantation labour. These four districts form the coffee and tea area of the State. The plantation labour only comprises a very small indigenous contingent, the great majority being imported workers.

A campaign was first organised for the mass treatment of labourers in all the coffee and tea estates. The treatment was administered by a mobile squad under the direction of a qualified health officer, who carried out egg counts before and after treatment. Intensive propaganda was conducted by cinema, lectures and distribution of posters in the area to encourage the estate authorities to take full advantage of the treatment campaign.

During a period of three years, the staff covered two of the heavily infected districts, Hassan and Kadur. At this stage the special staff was withdrawn and an experiment in the treatment for hookworm of all persons attending the dispensaries in the area, irrespective of their special ailments, was tried, but without much success.

The whole work has now been reorganised once more on the previous plan, with one medical officer and three laboratory

assistants. The staff make a first visit to each village in the infected area for propaganda and follow this up on the next day with treatment. Arrangements have also been made for simultaneous provision of bore-hole latrines for each village by the Bureau of Sanitary Engineering. This work is now in progress in the Mysore district. It is felt that this work will have to be kept up continuously for some years till the villagers are thoroughly accustomed to use the sanitary latrines provided instead of indiscriminately polluting the soil as at present.

Tuberculosis.

Annual Mortality based on figures for a recent five-year period.

	1931	1932	1933	1934	1935
(a) Pulmonary tuberculosis, in-patients	119	93	113	117	241
(b) Other forms of tuberculosis, in-patients	41	51	61	57	65
Total deaths in hospitals	160	144	174	174	306

Total deaths from districts and cities in Mysore State only for 1935 :

Urban	1,107
Rural	3,403
Number of deaths per 100,000 of population during 1935	68

Cases diagnosed in Dispensaries and Hospitals.

	1931	1932	1933	1934	1935
(a) Tuberculosis of the lungs	3,229	2,463	3,628	2,815	6,376
(b) Tuberculosis, other forms	2,316	2,327	4,026	2,643	4,641

Information is not available as regards incidence in rural areas.

It is generally found that Mohammedans and others observing the strict purdah system, especially the women, fall an easy prey to the disease.

Registration of deaths is being carried out by the State registrars, generally patels of villages. Cases of death from any prolonged or wasting disease are returned as due to " Kshaya ", which is translated as tuberculosis.

There is no notification of tuberculosis as there is no legislation to that effect.

The State maintains a tuberculosis sanatorium at Mysore, which has accommodation for 100 patients. An out-patient dispensary exclusively for the treatment of the disease is also maintained in Mysore City. In addition to these, about twenty beds are provided for the admission and treatment of tuberculosis cases in the epidemic diseases hospital, Bangalore.

There are no tuberculosis wards in the general hospitals.

In Mysore City, the doctor attached to the out-patient tuberculosis dispensary also generally pays house-to-house visits and speaks to patients about after-care. Lady health visitors in Bangalore and Mysore also do this work.

Students of the Medical College are given a two months' course of lectures and clinical training in tuberculosis. Post-graduate courses are also provided in the sanatorium at Mysore, where subordinates in service are posted by rotation for three months' training.

Leprosy.

A leprosy survey was made in 1932, but the methods employed for detecting and establishing cases of leprosy have not been clearly indicated. The cases were mostly identified clinically and no laboratory methods were used for diagnostic purposes.

The villages that have been affected in the Mysore district are confined, practically speaking, to the eastern portion of Mysore district adjoining Coimbatore and the Kankanhalli taluk of Bangalore district.

The total number of patients for Mysore district is 246; 50% of the cases are in four hoblies of Mysore and the other 50% are in the ten other hoblies.

The number of villages infected in the Kolar district is eight, and the disease is practically limited to Goribidanur hobli.

The State Leprosy Relief Committee is now looking after patients in the infected areas and the measures at present taken mostly consist of giving medical treatment in the dispensaries in the areas or of weekly visits by the doctor to heavily infected localities. The patients are usually expected to come to the dispensary and take treatment. The sub-assistant surgeons advise the patients to go to Bangalore Leper Asylum if they are ready to do so. Leprosy handbills are distributed

by the sub-assistant surgeons when they visit the villages, and a stock of these is kept in the dispensaries. A film on leprosy has been produced and is used by the Bureau of Health Education, Department of Health.

There are probably a number of stray cases sparsely distributed all over the State. It is accordingly preferable to make a systematic survey throughout the territory of the State in order to detect clinical cases and confirm the diagnosis by laboratory findings. Two endemic areas have been definitely established and here the whole of the people must be examined, special attention being given, however, to the lower-age group, so that early cases may be detected.

The appointment of a special staff for the systematic investigation of all cases throughout the State and detailed examination for the detection of early cases in the recognised endemic areas is under consideration by the Government. It is proposed to appoint a full-time medical officer, who would receive the necessary training and would then continue in this work undisturbed by transfers.

Guinea-worm.

The disease being prevalent in Chitaldrug district, an investigation for its control has been made with the co-operation of the Rockefeller Foundation. The staff consists of one second-class health officer, one medical assistant, one sanitary inspector and fieldmen. It should be said that, as a result of this investigation, a very promising biological method of control has been worked out, using three local species of fish, two of which are column feeders keeping down the cyclops and one a bottom feeder feeding on the eggs.

Besides this, step-wells, which are the main sources of water supply as well as of infection, are being systematically converted into draw-wells wherever possible.

Fish nurseries have been established in convenient centres, and all the step-wells still in use as such in the infected villages are now being regularly stocked with the fish after a preliminary treatment with perchloron for the removal of other predatory fish.

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