CHAPTER II

THE CAMPAIGN AGAINST COMMUNICABLE DISEASES

The health statistical indices analysed in Chapter I indicate that there has been a gradual and steady progress in public health. A gradual reduction is noticed in the mortality from cholera, smallpox and plague, among other things. These are important notifiable diseases. It is generally believed that information on these is better than other diseases. The general public are also aware of the symptoms of these diseases and, therefore, there is no difficulty in reporting the cases to the Village Headman. But better knowledge about identifying the symptoms of the diseases in notifying deaths does not itself bring down their contribution to overall mortality rates. The most important thing is the ability of the organisation of health care delivery system to take advantage of this knowledge for use in reducing the morbidity and mortality due to various diseases. A well equipped health care system also does not itself bring down the mortality rates, since ultimately the whole system depends upon the knowledge available about the various diseases.

The focus of this chapter is on the characteristics and prevalence of the diseases like cholera, smallpox, plague, tuberculosis, leprosy, malaria and filariasis, and the preventive
and control measures taken by the Government during the period of this study. A study of these diseases, which were prevalent in the Madras State, will provide an understanding of the role of various factors that determined the nature, extent and timing of the measures taken by the Government.

CHOLERA

Cholera is an acute and highly infectious gastro-intestinal disease with high morbidity and mortality occurring mostly in the Asian countries, at present.

OCCURRENCE

Cholera is a water-borne disease. It was endemic in parts of India. The first great endemic ravages occurred in the years from 1817 to 1819. During this period, it spread through shipping eastwards to China and Japan. It further moved up to the shores of the Mediterranean through Mesopotamia and up to the east coast of Africa across the Indian Ocean. This was followed by the pandemics in the years, from 1826 to 1837, 1840 to 1862, 1865 to 1875 and 1879 to 1911. The pandemics followed the course of trade routes and human travel. For sometime, the disease was stopped by quarantine. Later, it broke out at intervals.

TRANSMISSION

Cholera is an infectious disease, the infecting agent
being cholera vibrios discovered by Koch in 1884. The vibrios enter the body of man by ingestion with food and drink and produce their lesions mainly in the intestinal track, particularly the lower half of the small intestines, where the medium they live in is mainly alkaline. 1 They do not ordinarily survive in the stomach, as the contents of the stomach in a perfectly healthy person are acid from the presence of gastric juice and the acid kills the cholera germs.

SEASONAL FACTORS

The disease is strongly influenced by geographic and climatic factors. 2 General studies have shown that rainfall, humidity and temperature are closely connected to the prevalence of cholera. 3 The major part of cholera incidence occurs in Madras State, with the arrival of the north-east monsoon during November and December. January and February considered as the post-monsoon cool, dry season provide favourable conditions for the persistence of incidence in the State following the monsoon rains. The season next in importance with regard

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1 Health, Vol. XIX, 1941, p.54.


to cholera incidence and deaths is the hot, dry season (March to May) when water supplies are at their lowest and large number of fairs and festivals occur in the State.

Villagers who attended the festivals conveyed the infection to their villages although the festival centres themselves were free from cholera. These festivals took place during April and May when because of the high atmospheric temperature the villagers used to drink any water to quench their thirst enroute, and the numerous drinking water sources such as wells and tanks were almost dried up or contained only small quantities of highly polluted water. If any of these sources was infected, there was a sudden flare up on account of the high concentration of infection. Migration of small groups of labour class families from village to village in search of food and work was really a serious problem. The unsatisfactory food situation in some of the rural areas had aggravated the situation.

Migration of labour was common for transplantation and harvesting work and for groundnut picking according to the season. There was absolutely no control over such movements of small groups of labour population from place to place as

5 ibid., p.625;
they left their villages when they pleased and took shelter enroute on road sides or fields according to convenience. Whenever cholera occurred amongst them, they simply scattered themselves into several villages leaving behind their dead and diseased and disseminating the infection far and wide.

Previously the incidence followed the river systems in its pattern of spread. This pattern appeared to have changed with the introduction of road and rail transport systems. The pattern was further changed by agricultural and labour migrations in the Madras State. This proved that there was no definite route for the spread of cholera which could be traced easily.\(^6\) The study of the periodicity of cholera by Russell revealed that there was a six yearly cycle in the occurrence of cholera epidemics in Madras State.\(^7\)

**PREVENTION AND CONTROL**

The main preventive measures are, firstly, destruction of cholera vibrios and prevention of contamination by them of food and water and secondly, anti-cholera inoculations to increase the immunity of the individual to cholera infection.

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Disinfection of cholera excrements, etc., chlorination of water supply, prevention of fly breeding, better cleansing and conservancy, protection of food and drink from dust and flies, and such other measures come under the first item. Of course, the provision of safe-water supply and sufficient and proper sanitary convenience are the permanent remedies.  

Preventive inoculation was first introduced on a large scale in Calcutta by Haffkine. The vaccine was first produced at the Haffkine Institute, Kasauli. Later on it was produced in other places like the King Institute, Guindy, Madras. The inoculation is very effective in preventing the incidence of cholera.

PREVALENCE AND THE RESPONSE OF THE GOVERNMENT

The recorded average mortality from cholera in Madras State during each of the eight decades may be seen in Table 2.1. It is seen that in the second of these eight decades there was a fall in the mortality by about 50 per cent. It remained at the same level, with minor variations for four decades. In the sixth and the seventh decades again, there was a successive reduction in the mortality by 50 per cent in each decade. The slight rise in the last decade was due to the

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### TABLE - 2.1

**AVERAGE MORTALITY RATES FROM CHOLERA IN EACH OF THE DECADES FROM 1871 TO 1950 - MADRAS STATE**

<table>
<thead>
<tr>
<th>Years</th>
<th>Average annual deaths from cholera</th>
<th>Estimated mid-decade population</th>
<th>Average annual death-rate per 1000 of the mid-decade population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td>69,300</td>
<td>30,561,806</td>
<td>2.27</td>
</tr>
<tr>
<td>1881-1890</td>
<td>41,368</td>
<td>33,240,999</td>
<td>1.24</td>
</tr>
<tr>
<td>1891-1900</td>
<td>60,446</td>
<td>36,937,041</td>
<td>1.64</td>
</tr>
<tr>
<td>1901-'10</td>
<td>59,003</td>
<td>39,817,529</td>
<td>1.49</td>
</tr>
<tr>
<td>1911-'20</td>
<td>60,929</td>
<td>41,862,149</td>
<td>1.46</td>
</tr>
<tr>
<td>1921-'30</td>
<td>30,753</td>
<td>43,154,396</td>
<td>0.71</td>
</tr>
<tr>
<td>1931-'40</td>
<td>16,918</td>
<td>46,555,135</td>
<td>0.36</td>
</tr>
<tr>
<td>1941-'49</td>
<td>28,613</td>
<td>50,830,533</td>
<td>0.56</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1949.
unprecedented epidemic of 1943. During the period from 1940 to 1952 the incidence of cholera was the lowest (0.01 per 1000 of population 1946). It was the lowest recorded since sixty five years ago.\footnote{9} The highest rate recorded was in 1943 (2.33).\footnote{10} During 1952 it was 0.61 as against 0.15 in 1940.\footnote{11}

The districts most affected during 1940-'52 were Trichirapalli, Tinnevelly, Chittoor, Salem, Madura, North Arcot, Tanjore, Coimbatore, South Arcot, the Nilgiris, Malabar, East Godavari, West Godavari, Vizakhapatnam, Srikakulam, Krishna, Bellary, Anantapur and Cuddapah. The towns affected were Madras, Salem, Vaniyambadi, Chittoor, Nellore, and Cuddapah.\footnote{12} All the Municipalities recorded around 2,177 deaths. Generally, the Chief vulnerable areas for cholera were the three river basins of Cauvery, Krishna and Godavari.\footnote{13}

RESPONSE OF THE GOVERNMENT

Mass inoculation campaigns, chlorination of water sources

\footnote{9}{G.O.No.3141, \textit{Public Health}, 16 September 1947.}
\footnote{10}{G.O.No.2476, \textit{Public Health}, 5 September 1944.}
\footnote{11}{ARDPH, 1949, p.13; G.O.No.3597, \textit{Public Health}, 18 August 1941.}
\footnote{13}{A.B. Fry, "Cholera in Bengal : Past and Present", \textit{Indian Medical Council}, 60 (July 1925), pp.301-307.}
and disinfection of infected materials and houses in all affected districts were carried out intensively in Madras State. The usual anticipatory inoculation of agricultural labourers was done during the groundnut harvest season and residents in other vulnerable areas (banks of rivers, channels and streams) by concentrating epidemic reserve Health Inspectors. Cases of cholera were isolated in isolation wards or sheds put up for the purpose and treated with sulphanamidem dine saline. Saline transfusion was given wherever possible. This reduced deaths among cholera cases.

The entire epidemic reserve Health Inspectors were concentrated in the affected areas to augment the normal health staff. Epidemic control vans and departmental jeeps with trailers were all detailed for work in the affected areas. The vehicles helped the prompt movement of staff and equipment to the affected areas and in the transport of patients to the nearest isolation wards or sheds. It had been proved that compulsory immunisation of people in place of voluntary vaccination was a successful method of controlling the outbreak of cholera.¹⁴ For a country like India, community education is necessary to combat the outbreak of cholera. The enforcement of isolation, quarantine, protection of water, food and milk supplies and so on, depend upon the public understanding and

acceptance of responsibility. Education is, therefore, essential for the promotion of any programme of control of cholera or any other infectious disease.

It is true that in times of cholera epidemics, the Government adopted only temporary measures like isolation and treatment of cholera patients, chlorination of water supply sources, immunisation of people by anti-cholera inoculation, propaganda on mode of transmission and prevention of the disease etc. But, cholera being primarily a water-borne disease, the Government realised the importance of the permanent measure of provision of protected water-supply as the only way to eradicate cholera. The Government and the local bodies took various steps in this regard and implemented several protected water-supply schemes subject, of course, to availability of financial resources. As for other preventive measures against cholera infection, control over production, distribution and sale of food articles in cholera infected areas was found to be effective due to the enforcement of the provisions of the Public Health Act, 1939.

SMALLPOX

HISTORICAL BACKGROUND

Smallpox is one of the major epidemic diseases of the world. The disease ravaged the population of ancient India and China, and left its hideous mark on Egyptian mummies
and played a part in the weakening of great empires, including the mighty Roman empire. Europe was affected by it in the Middle Ages when it was introduced by the Saracens and England had its first experience of the disease in the 16th Century. The importation of the disease in America was through the African Negro slaves.  

**CHARACTERISTICS OF THE DISEASE**

The early symptoms are pain all over the body and fever followed by headache. Subsequently, on the third or the fourth day, a rash appears all over the body and eruptions develop in the skin particularly on the facial portion and the mucous membrane three or four days after the onset. The incubation period varies from ten to twelve days. The sources of the virus is in the eruption of the skin and the mucous membrane. The virus spreads through contact with the diseased person and his discharges from the nose, mouth and skin eruptions. The linen, utensils, etc., contaminated with the discharges may contribute to the spread of the disease. The spread of the infection is possible from the dried infected scales shed from sores and carried by air. Flies and other insects also act as carriers.  


PREVENTION AND CONTROL

In India, smallpox occurs during the dry months from March to May. The principal methods of control and prevention of the disease are:

(i) to discover the first case and the source of infection,
(ii) to isolate the patient,
(iii) vaccination,
(iv) quarantine,
(v) Health Education.

DETECTING CASES

As soon as the first case is discovered, administrative action should be taken to prevent the spread of infection; delay gives the virus more opportunities to become disseminated through the patient's contact with people in his social life and work, and through contaminated dust and articles such as bed linen and clothing.

ISOLATION

Once the diagnosis has confirmed that the patient is suffering from smallpox, he should be isolated effectively. This can be done in hospitals specially reserved for smallpox cases, because the disease is highly infectious, and the patient
has to be isolated with great care from the early stages until the scales have separated completely, and healed and dry scars have formed. The patient's discharges, clothing and all other objects he has come in contact with should be thoroughly disinfected.

PREVENTIVE MEASURES

VACCINATION

Doctor Edward Jenner discovered the smallpox vaccine in 1796. He demonstrated that the inoculation of cow-pox virus in man produces an attack of cow-pox in him and that this attack of cow-pox protects him against the human disease, smallpox. Though vaccination was introduced first into the Bombay Presidency in 1830, it was used regularly from 1930 onwards. The introduction of the vaccination had caused a shift in mortality from smallpox. Under the provisions of the Vaccination Act of 1880, every newly born child was required to be vaccinated within a period of six months. But the progress of vaccination was slowed in India due to the following reasons:

(a) Traditional belief: People felt that the disease was


caused by the wrath of a Goddess like Mariamma; 19

(b) The old method of vaccination (viz., lancet used for vaccination was rather crude and caused bleeding) did not find favour with the masses;

(c) Difficulties experienced in retaining the potency of liquid lymph which was supplied in the initial stages;

(d) Slackness of supervision and inadequacy of the staff in the early years.

Vaccination lymph is made in India in every State. In Madras State it is produced in the King Institute, Guindy. In this connection it would be of interest to note that Lord Curzon in his speech while opening the King Institute in 1905 had said, that ancient Indians used animal vaccination secured by transmission of smallpox virus through the cow. This interesting theory was based on a quotation from the writings of Dhanvanthari, the greatest of the ancient Indian Physicians. It is as follows:

"Take the fluid of the pock on the udder of the cow on the point of the lancet and lance with it the arms between the shoulders and elbows

until blood appears; then on mixing the fluid with the blood the fever of the smallpox will be produced”.

This is vaccination pure and simple. It would thus seem that Jenner’s great discovery was actually forestalled by the ancient Indians. 20

The Bhore Committee appointed by the Government of India has pointed out in its report that the rate of incidence of smallpox in India is the highest among all countries, and that the large amount of suffering and mortality for which smallpox is responsible should be permitted to continue, is all the more regrettable because we have in vaccination a powerful weapon with which the disease can be kept under effective control. The Committee pointed out that the practice in all States was to carry out routine vaccination mainly during the cooler months of the year with a view to avoid deterioration in the quality of the lymph vaccine. Thus the period of vaccination was limited to six or seven months. If it was spread to twelve months, a high level of protection against smallpox would have been achieved much earlier. 21 The chief causes militating against the success of the vaccination efforts

\[20\] M.A. Kamath. Preventable Diseases and Disabilities of our Clime, p.205.

\[21\] Report of the Health Survey and Development Committee, op.cit., p.111.
were: (i) the difficulties of keeping lymph potent for long enough periods to make it possible to despatch it to the remotest corner of the country and to take it for use in time, (ii) faulty techniques of vaccination adopted by improperly trained vaccinators, and (iii) the actions of ill-informed people resulting in nullification of the effect of vaccination. No periodical routine vaccination drive had been organised. Efforts were made to vaccinate the people only in the presence of epidemics. The result was that only a temporary control was imposed on the incidence of the disease.  

An Expert Committee on Smallpox appointed by the Government of India had made the following observations:

(i) Smallpox shows a definite seasonal prevalence and that the incidence reaches epidemic proportions during the first six months of the year;

(ii) Smallpox generally shows periodicity, the incidence being significantly high every five or six years;

(iii) There is need for accurate registration of births and deaths. Unless it is known how many babies have been born, it cannot be made certain that primary vaccination has been carried out with cent per cent.

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coverage. Deaths, if registered disease-wise, would help focus attention on preventible diseases that take heavy toll of life and would enable the Public Health authorities to take appropriate control measures.

The other preventive measures are:

(a) Surveillance and vaccination of contacts. They should be watched and excluded from work for 21 days;

(b) International measures: Seaport quarantine procedure - compulsory vaccination of persons moving out of endemic areas or infected seaports. Quarantining of persons of infected ship or persons moving out from infected ship without vaccination is necessary;

(c) Health education measures: There are some people who are conscientious objectors of vaccination. A regular Health Education Campaign through audio visual and other methods is highly desirable.

The most suitable age for vaccination is about the sixth month, as at that time there is less chance of accidental infection of the vaccination-wounds and less constitutional disturbance than in the later childhood. Those who were

23 ibid., pp.266-267.
vaccinated in infancy should be revaccinated about the sixth year. Statistical evidence (age-wise) proved (Table 2.2) that vaccination did confer protection against an attack of the disease, that the course of the disease was modified for the vaccinated person and that the fatality from smallpox in the vaccinated was very little compared with that in the unvaccinated.24

The following remarks are called for on the figures furnished in Table 2.2:

(i) The incidence in the vaccinated group was low in early age periods, high in the age group 20-25 years and again gradually declined. There was, therefore, an indication that the immunity conferred by vaccination in the early age periods gradually wore out as the period elapsed since vaccination increased. The need for revaccination of the adolescent at about school-leaving age was justified;

(ii) In the unvaccinated group, the incidence was high in the early age periods up to ten years and gradually decreased. The high incidence in the early age periods in the unvaccinated groups as compared with the vaccinated group indicate the protection afforded

<table>
<thead>
<tr>
<th>Age Periods (Years)</th>
<th>Vaccinated as evidence by at least one</th>
<th>Not vaccinated and vaccinated during incubation period and said to have been vaccinated without marks</th>
<th>Case fatality rate per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attacks</td>
<td>Deaths</td>
<td>Attacks</td>
</tr>
<tr>
<td>0 - 1</td>
<td>1</td>
<td>0</td>
<td>178</td>
</tr>
<tr>
<td>1 - 5</td>
<td>19</td>
<td>7</td>
<td>433</td>
</tr>
<tr>
<td>5 - 10</td>
<td>44</td>
<td>6</td>
<td>203</td>
</tr>
<tr>
<td>10 - 15</td>
<td>24</td>
<td>2</td>
<td>56</td>
</tr>
<tr>
<td>15 - 20</td>
<td>62</td>
<td>3</td>
<td>61</td>
</tr>
<tr>
<td>20 - 25</td>
<td>88</td>
<td>4</td>
<td>81</td>
</tr>
<tr>
<td>25 - 30</td>
<td>66</td>
<td>3</td>
<td>54</td>
</tr>
<tr>
<td>30 - 35</td>
<td>31</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>35 - 40</td>
<td>29</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>40 - 45</td>
<td>22</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>45 - 50</td>
<td>15</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Above 50</td>
<td>19</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>420</td>
<td>36</td>
<td>1185</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1950, p.20.
by vaccination:

(iii) The case fatality rates among the unvaccinated in each group was greater than that among the vaccinated, the differences was very high in the age groups between 20 and 40 years. The extreme susceptibility of and high fatality in the age group 0-1 was a fact to be taken note of. The importance of protecting this group by timely vaccination was apparent. In this connection it may also be noted that vaccination in infancy did not always secure immunity in the adult, although it may have reduced the virulence of an attack.  

PREVALENCE AND THE RESPONSE OF THE GOVERNMENT

The incidence of smallpox in Madras State showed a clear relationship with certain age groups (Table 2.3). It is seen that percentage of deaths among infants under one year ranged from 18.52 to 29.51 per cent and that among children between 1 to 10 years oscillated from 31.28 to 40.04 per cent during 1940-'51. The combined proportion of deaths among these two groups worked out a higher percentage of about 60 per cent during 1940-'51. This clearly indicated the need

<table>
<thead>
<tr>
<th>Year</th>
<th>Under 1 year</th>
<th>Between 1 to 10 years</th>
<th>Above 10 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deaths</td>
<td>Percentage to total</td>
<td>Deaths</td>
<td>Percentage to total</td>
</tr>
<tr>
<td>1940</td>
<td>951</td>
<td>22.06</td>
<td>1,502</td>
<td>34.85</td>
</tr>
<tr>
<td>1941</td>
<td>610</td>
<td>22.14</td>
<td>984</td>
<td>35.72</td>
</tr>
<tr>
<td>1942</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
</tr>
<tr>
<td>1943</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
</tr>
<tr>
<td>1944</td>
<td>3,461</td>
<td>17.50</td>
<td>7,918</td>
<td>40.04</td>
</tr>
<tr>
<td>1945</td>
<td>4,283</td>
<td>20.76</td>
<td>7,287</td>
<td>35.31</td>
</tr>
<tr>
<td>1946</td>
<td>2,211</td>
<td>27.91</td>
<td>2,669</td>
<td>33.69</td>
</tr>
<tr>
<td>1947</td>
<td>782</td>
<td>29.51</td>
<td>829</td>
<td>31.28</td>
</tr>
<tr>
<td>1948</td>
<td>543</td>
<td>18.52</td>
<td>983</td>
<td>33.53</td>
</tr>
<tr>
<td>1949</td>
<td>1,688</td>
<td>28.52</td>
<td>2,261</td>
<td>38.21</td>
</tr>
<tr>
<td>1950</td>
<td>3,250</td>
<td>22.78</td>
<td>4,656</td>
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</tr>
<tr>
<td>1951</td>
<td>3,921</td>
<td>22.75</td>
<td>6,694</td>
<td>38.84</td>
</tr>
<tr>
<td>1952</td>
<td>1,602</td>
<td>3.13</td>
<td>1,671</td>
<td>3.27</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1940-'52.
for intensifying primary vaccination among children. During 1952, the percentage of death came down considerably to 3.13 per cent in respect of infants under one year of age and 3.27 per cent for children between 1 to 10 years. This was mainly due to the importance given in the implementation of the smallpox eradication programme under the First Five Year Plan. This reduction in the mortality among these two groups was also reflected in the increase in the primary vaccination figures for 1951-'52 (Table 2.4). Table 2.3 also shows the increasing proportion of deaths among those above 10 years of age. This trend justified the need for intensive vaccination and revaccination among this age group. The increasing trend in the mortality in this group could be seen from the statistics of revaccination for the period 1951-'52 (Table 2.3). The low success rate of revaccination (Table 2.4) is a clear indication of the ineffectiveness of the work done.

During 1940-'52 all the districts in Madras State were affected by smallpox at some period or other. The districts that reported mortality were Chittoor, North Arcot, South Arcot, Vizakhapatnam, Guntur, Srikakulam, Nellore, Malabar, Chingleput.

26 ARDPH, 1940-'51.

27 ARDPH, 1940-'52.
<table>
<thead>
<tr>
<th>Year</th>
<th>Primary</th>
<th>Revaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>95.6</td>
<td>19.4</td>
</tr>
<tr>
<td>1941</td>
<td>96.9</td>
<td>18.5</td>
</tr>
<tr>
<td>1942</td>
<td>N.A</td>
<td>N.A</td>
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<tr>
<td>1943</td>
<td>N.A</td>
<td>N.A</td>
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<tr>
<td>1944</td>
<td>93.8</td>
<td>26.6</td>
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<td>1945</td>
<td>84.9</td>
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</tr>
<tr>
<td>1951</td>
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<td>12.4</td>
</tr>
<tr>
<td>1952</td>
<td>96.3</td>
<td>19.0</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1940-'52.
Coimbatore, West Godavari, Tanjore, and Cuddapah. It is however, seen from Table 1.20 - Chapter 1 - the mortality due to smallpox had come down to 0.09 per 1000 of population during 1952.

The vaccination operations performed in Madras State during the period of this study are given in Table 2.4. The total number of vaccinations done in the State during the year 1944 was a record number. There was an increase of over three million under revaccinations, when compared with the previous year. The total number of vaccinations done during the year represented 14.1 per cent of the population of the Madras Province. Due to the prevalence of smallpox in the Province, there was no cessation of vaccination during the hot weather months of the year and mass vaccination was conducted throughout the year.

During 1946, there was a decrease in the total number of vaccinations as compared to 1945. The decrease was due to a drop in revaccinations. The smallpox epidemic in 1945 necessitated a vigorous vaccination drive and a fifth of the

population of the Province was revaccinated. The total number of vaccination done during the year represented 164.5 per thousand of the population of the Province. The number of vaccination done in the year, however, represented 16.5 per cent of the population of the Province as compared to 14.1 per cent in 1944 and 23.2 per cent in 1945.\textsuperscript{30}

The number of vaccination operations done in the year 1951 was the highest during the decade 1942-'51 and covered 24.3 per cent of the estimated mid-year population.\textsuperscript{31} During 1952 there was a fall of 13 per cent in the primary and 43 per cent in the revaccination as compared to 1951. The large fall in the number of operations was due mainly to the sharp fall in the incidence of smallpox in the State in 1952 (0.09 vide Table 1.20 in Chapter I) but was of the same order as in non-smallpox epidemic years.\textsuperscript{32}

Although primary vaccination was made compulsory throughout the State, the provisions of the Vaccination Act was not enforced in many areas of the State. Revaccination was made compulsory only in the early 1930's. Table 2.5 gives the progress of primary vaccination and revaccination during 1940-'52.\textsuperscript{33} The number of primary and revaccination

\begin{itemize}
\item \textsuperscript{30} G.O.No.3141, \textbf{Public Health}, 16 September 1947.
\item \textsuperscript{31} G.O.No.3434, \textbf{Health}, 1 November 1952.
\item \textsuperscript{32} G.O.No.383, \textbf{Health}, 15 February 1954.
\item \textsuperscript{33} ARDPH, 1940-'52.
\end{itemize}
operations performed increased during 1949-'51. In 1952, the number of operations performed came down considerably. In this connection it may be noted that the number of operations performed always showed a downward trend when the number of deaths from smallpox showed any fall. For example, this trend is noticed in the year 1940-'43 and 1947-'49, when the number of deaths from smallpox came down (Table 1.20 - Chapter I) and so also the number of vaccination operations performed (Table 2.5).

So far as isolation of the patient is concerned, the Government enjoined that the isolation wards should be outside the premises of the general hospitals at a distance varying from 50 to 100 yards. This resulted in the construction of temporary or permanent sheds in certain local areas - far removed from the general hospital premises with little facilities for adequate medical and nursing care, with consequent unpopularity of the smallpox isolation sheds. However, in certain major hospitals like the Erskine Hospital, Madura, and the King George Hospital, Vizakhapatnam smallpox and chickenpox cases were admitted and treated in separate isolation wards provided inside the hospital premises itself.34

The Smallpox Eradication Programme was launched by the Government much later. The programme consisted of three phases, namely (1) Preparatory phase, (2) Attack phase

### TABLE - 2.5

**PROGRESS OF VACCINATION**

**MADRAS STATE (1940-'52)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Primary Vaccination</th>
<th>Revaccination</th>
<th>Total Vaccinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>1,502,042</td>
<td>3,464,968</td>
<td>4,967,010</td>
</tr>
<tr>
<td>1941</td>
<td>1,537,010</td>
<td>3,269,163</td>
<td>4,806,173</td>
</tr>
<tr>
<td>1942</td>
<td>1,324,257</td>
<td>3,073,742</td>
<td>4,397,999</td>
</tr>
<tr>
<td>1943</td>
<td>1,172,235</td>
<td>3,452,130</td>
<td>4,624,365</td>
</tr>
<tr>
<td>1944</td>
<td>1,516,537</td>
<td>6,510,363</td>
<td>8,026,900</td>
</tr>
<tr>
<td>1945</td>
<td>1,579,394</td>
<td>10,391,876</td>
<td>11,971,270</td>
</tr>
<tr>
<td>1946</td>
<td>1,633,572</td>
<td>6,950,533</td>
<td>8,584,105</td>
</tr>
<tr>
<td>1947</td>
<td>1,528,073</td>
<td>3,353,303</td>
<td>4,881,376</td>
</tr>
<tr>
<td>1948</td>
<td>1,618,385</td>
<td>3,250,281</td>
<td>4,868,666</td>
</tr>
<tr>
<td>1949</td>
<td>1,848,634</td>
<td>6,556,856</td>
<td>8,405,490</td>
</tr>
<tr>
<td>1950</td>
<td>1,816,966</td>
<td>9,123,679</td>
<td>10,940,645</td>
</tr>
<tr>
<td>1951</td>
<td>2,144,255</td>
<td>11,722,423</td>
<td>13,866,678</td>
</tr>
<tr>
<td>1952</td>
<td>1,872,795</td>
<td>6,669,864</td>
<td>8,542,659</td>
</tr>
</tbody>
</table>

*Source: ARDPH, 1940-'52.*
including consolidation phase, and (3) Maintenance phase until eradication is achieved. All phases of the programme were supplemented by concurrent and final evaluation of the operations, and necessary steps taken to rectify shortcomings and defects.

In Madras State, the Director of Public Health as the Head of the Public Health Department, controlled the administration of vaccination in the State. He was assisted by an Assistant Director of Public Health who was in overall control of the administration of vaccination. At the district level, vaccination work was under the control of the District Health Officers. They were assisted by Health Inspectors and Vaccinators. Each district was divided into ranges, each under the control of a Health Inspector. The vaccinators appointed and paid by the local bodies including Municipalities worked under the control of the Health Inspectors. Each range was further divided into circles and the circles into groups with reference to the total strength of the vaccinators. One group was allotted to each vaccinator. Each vaccinator was expected to do a minimum work of 250 to 500 cases per month.

To conclude, it is clear that a combination of methods is required to stop the spread of smallpox and that they are all cumulative in their effects. The main tasks are to diagnose

the case early, isolate the patient, and disinfect the possessions which may be infected, trace the contacts and protect them from vaccination, and keep them under supervision until the risk of their developing smallpox is passed. It is only by concentrating on all these measures that the spread of the infection can be effectively controlled.

PLAGUE

HISTORY OF THE EPIDEMIC

Plague has been known to be one of the major pestilences of mankind in the world. It had killed millions of people. The first human epidemic on record was the outbreak among Philistines in 1320 B.C. The disease has been referred to in the Bible (1 Samuel, V and VI). The Indian Scripture Bhagavata Purana (1500-1600 B.C.) recorded a description of plague which indicated that it had been communicated by rats. However, more reliable account of plague was found beginning from A.D.200 from the writings of Rufus, the Physician at Ephesus. The subsequent happenings are important to understand the nature of the disease.

THE PANDEMICS

There were three pandemics ravages of plague. The first one occurred during the reign of Emperor Justinian (A.D. 543). It started in Egypt from where it spread through North
Africa to the Roman Empire, Syria, Palestine, Constantinople and then to other parts of Europe, Asia and England. It prevailed for about sixty years and took a toll of about 100 million people. The second pandemic started in the 14th Century (A.D.1347) from Crimea and spread to China, India, Asia Minor, North Africa, Europe and England. The disease ravaged Europe for three centuries creating horror of what was known as 'Black Death'. It killed about 25 million people. Retregression started in the 17th century from West to East completely leaving the European stronghold by 1841. This prolonged pandemic in Europe ushered in what is known as Renaissance in historical terms. During this pandemic Asia including India suffered much and millions died.

The third pandemic (A.D.1894) was traced to the plague which reappeared in South China in 1866 from where it reached Canton and Hongkong in 1894. It then spread to all countries except Europe by 1900. It reached Calcutta in 1895 and Bombay in 1896. The death toll was 10.25 million. India, of course, suffered most. Since then, the mortality from plague in India has been one of continuous fall. Actually no death from plague has been recorded in India since 1969.


37 ibid.

38 ibid., p.3.
MODE OF INFECTION

In India, the house rat was the commonest source of human infection. These rats received the infection from the sewer rats. The infection is conveyed from rats to man through rat flea. The infected house rats are often seen to come out into the open or to the floor of the house, make erratic movements and may even scream before dying. When such a behaviour is seen in a rat particularly with a swollen neck and the inguinal glands, plague should be at once suspected.

The disease usually spreads by contiguity, but it may also spread to distant places through infected rats or fleas being carried with commodities or in persons body or clothes and also from one country to another through maritime or aerial transport. It has predilection to dirty, insanitary dwellings more particularly in the ground floor attacking generally the poor classes of people in the rat infested huts. Granaries, store rooms, broken store dumpings and disposed refuse and dustbins attract and harbour rats, and thus form foci for the spread of infection. The climatic factors influence the numerical prevalence and longevity of rat fleas and multiplication of the plague organism in both rats and fleas.

PREVALENCE

Plague was reported to have first appeared in Madras.
Presidency in August 1898. Guntakal in Anantapur district was infected from Hubli in Bombay Presidency. Subsequently, several places were affected by cases from Mysore and Hyderabad States, and the disease had since taken root in Madras State. Periodically it occurred in epidemic form. The average quinquennial mortality from plague recorded in Madras State since 1902 may be seen in Table 2.6.\(^{39}\) It will be seen therefrom that mortality increased up to the period ending 1925, steadily declined till the quinquennium 1936-'40. There was, however, a set-back in the period 1941-'45, followed again by a decline. The mortality from plague after 1925 decreased considerably compared with the preceding period.

The areas affected most are Hosur taluk of Salem district, the Municipalities of Bellary, Hospet, Hindupur, Coimbatore, Udamalpet, Pollachi, Tiruppur, Ootacamund, Coonoor and certain villages in Harpanahalli, Madagalli, Kudligi taluks of Bellary district and Madakasira taluk in Anantapur district, Madanapalle, Pungannur, and Kuppam taluks in Chittoor district, Kollegal and Sathyamangalam taluks in Coimbatore district and Gudalur taluk, Nilgiri district.\(^{40}\)

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<table>
<thead>
<tr>
<th>Period</th>
<th>Average Mortality from Plague</th>
<th>Period</th>
<th>Average Mortality from Plague</th>
</tr>
</thead>
<tbody>
<tr>
<td>1902-'05</td>
<td>12,500</td>
<td>1926-'30</td>
<td>1,993</td>
</tr>
<tr>
<td>(four years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1906-'10</td>
<td>3,168</td>
<td>1931-'35</td>
<td>1,546</td>
</tr>
<tr>
<td>1911-'15</td>
<td>7,197</td>
<td>1936-'40</td>
<td>878</td>
</tr>
<tr>
<td>1916-'20</td>
<td>13,875</td>
<td>1941-'45</td>
<td>2,139</td>
</tr>
<tr>
<td>1921-'25</td>
<td>7,823</td>
<td>1946-'50</td>
<td>1,215</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1950.
MEAN MONTHLY MORTALITY, 1947-51, AND
MONTHLY MORTALITY, 1952.

FIEVUE

(MADRAS STATE)

SMALLPOX.

Deaths (1000s)
GOVERNMENT'S RESPONSE

The usual Cyanogas fumigation method of control of plague was given up. There was, however, a wider switch-over to D.D.T. application. The use of D.D.T. in the prevention and control of the disease aimed at the destruction of the insect vector - the rat flea. It retains its potency in the field condition in the burrows for a period of nearly eighteen months. High degree of success was also achieved in the treatment of plague by the use of specific chemotherapy with sulphadiazin or antibiotic therapy with streptomycin or combined chemo and antibiotic therapy. Serotherapy (anti-plague horse Serum) which was the sheet-anchor prior to the discovery of Sulpha drugs is now rarely used. 41

In addition to the above remedial measures, Government had resorted to construction of rat-proof godowns and periodic surveys in endemic and potentially epidemic areas to determine prevalence of rats and fleas. Besides these, international quarantine measures were adopted in respect of ships, aircrafts, and land transport especially those arriving from plague infected areas. Therefore, it will not be necessary in future to resort to evacuation, restrictions on persons and goods at barricades as routine control measures. It can be confidently expected that with the continued adoption of the above methods plague

incidence in the State can be effectively and completely controlled.

LEPROSY

Leprosy is a disease of considerable importance in the developing countries of Asia, Africa and Latin America. Apart from being communicable, it also poses challenges in relation to its potential to cause physical deformities and consequent social stigmas. Like many other communicable diseases, it is closely associated with socio-economic under development. Without scientific treatment, its contagiousness remained unchecked, and segregation of the leprosy afflicted remained the only recourse to society. Now with the discovery of modern drugs, leprosy is no longer the dangerous and crippling disease it used to be. However, the old attitudes and prejudices die hard, leading to continued separation of the patient which is inhuman. It is, therefore, that a leprosy patient needs to be viewed with special consideration and treated with a sense of dedication and scientific approach.

HISTORICAL BACKGROUND

The disease has been prevalent since ancient times in India. An authentic reference to leprosy is found in the ancient medical writings of this country. The most ancient

writings are those of Charaka, Sushruta and Vagbhata. It is interesting to note that Choulemogra oil, which was till recently the main stay for the treatment of leprosy, and which was introduced into Western medicine late in the 19th Century, had been used in the treatment of leprosy in India from ancient times. Sushruta mentioned this in his book Sushruta Samhita.43 Reference to Kustha (Leprosy) was also made much earlier in Indian literature, viz., the Manu Smriti (The Code of Manu) and the Atharva Veda.

MISCONCEPTIONS

There were a number of misconceptions and wrong notions about leprosy among people. Some people still believe that leprosy occurs due to heredity, immoral behaviour, impure blood, and faulty eating habits. They also believe that leprosy is highly infectious and that it is incurable. A common belief is that a leper is a sinner.44 In this context one may remember a parable about Jesus Christ, that He sent His disciple with the King of Mesopotamia and cured him of leprosy. It is mentioned in the Book of St. Luke that, "As He entered into a certain village there met him ten men that were lepers which stood afar off. And they lifted up their voices and said,

44 Leprosy - Guide on Leprosy to Educate the Public. (Madras: Leprosy Division, Directorate of Medical Services).
"Master have mercy on us" and when he saw them, he said unto them, "Go, show yourselves unto the priests". And it came to pass, that as they went they were cleansed. A close look at the parable seems to prove the above common belief though scientifically this belief is not correct.

CHARACTERISTICS

It is now believed that leprosy is a chronic ineffective disease caused by Microbacterium leprae (leprosy bacillus) discovered by Hansen of Norway in 1874. Infectivity of the disease is of comparatively low degree. It is not catching as some of the acute infective diseases, like cholera, smallpox, common cold, etc. Every leprosy patient is not necessarily contagious. There are three main categories of leprosy viz., (i) Non-Lepromatous, (ii) Lepromatous and (iii) Border-line cases. The non-lepromatous patients are mostly non-contagious. Even if there is a slight degree of contagion, this does not last long. On the other hand, the lepromatous and border-line patients are in infective condition for a longer period depending on the stage of advancement of their disease.

TRANSMISSION

Leprosy germs are transmitted by a leprosy affected

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45 Health, Vol. XX, No. 1, 1942, p.33.
person in a contagious state. Continued and close direct contact between the skin of the healthy person and a leper can result in the disease being passed on to the former. Like many other diseases, leprosy germs also spread through coughing, sneezing, sputum, etc. The environment has a role in spreading leprosy. In general, germs which causes disease grow in unclean surroundings. People who are undernourished are more susceptible to these germs. So, leprosy patients should avoid spitting everywhere and coughing without covering their mouths. As in the case of other diseases, personal and environmental hygiene is very important in the prevention of leprosy.47

MODES OF INFECTIONS

The disease attacks the skin and the nerves resulting in acute numbness, atrophy of the muscle, pus formation and changes in the bone structure. The affliction of the nerves results in deformities such as claw-hand, the fingers and the palm become flat and twisted like the monkey's hand, ulcers, falling off fingers, sinking of the nose, wrist-drop, and atrophy of the foot. Because of the atrophied foot, the leprosy patients walk as if they are dragging themselves.48 There are many

47 Leprosy-Guide to Leprosy to Educate the Public, (Madras: Leprosy Division, Directorate of Medical Services).

LEPROSY

Fingers and palm of the hand afflicted by leprosy.
dreaded diseases like T.B., plague, smallpox, etc., which result in swift death. Smallpox leaves permanent marks on the face, but it does not alter its shape and appearance. But leprosy distorts the patient's face to such an extent that he is despised by everyone.

CONTROL, EDUCATION AND TREATMENT

The principles of control of infectious diseases like leprosy are (i) control of reservoir of infection, (ii) control of routes of transmission, and (iii) promotion of resistance of new host. Other measures are improving the general health standards by improved personal hygiene, environmental sanitation and suitable measures like avoidance of overcrowding, health education, etc. These are closely linked with improved economic condition and better education.

It is crucial to understand that medical attention and treatment cannot alone deal with the disease which is more social in nature. It is imperative to educate the community and to enlist the cooperation of leprosy patients, public, various health organisations, students, teachers, etc. The whole community should participate in tackling the problem. Ignorance should be removed and awareness created of the problem and the fact that leprosy is a curable disease. It is not a hereditary one and nearly 80 per cent of the patients are
non-infectious. Early detection and treatment would prevent deformity. Most of the leprosy deformities can be corrected. To cure the body of leprosy is not difficult. To remove the disease out of the mind takes longer time. 49

Leprosy is completely curable in a period of six months to three years depending on the type of the disease. Treatment is available free of cost at various centres. The sulphone drugs have revolutionised the treatment of leprosy. 50 Apart from D.D.S. (Diamino Diphenil Sulphone), other drugs and treatments such as physiotherapy and plastic surgery may become necessary. In recent times, the emphasis has been shifted from mono-theraphy to multi-drug therapy.

PREVALENCE AND RESPONSE OF THE GOVERNMENT OF VOLUNTARY INSTITUTIONS

In the Madras Presidency, leprosy campaign was initiated by the Government in 1929. The first policy of the campaign was to open out treatment facilities in all the medical institutions to treat cases of leprosy as out-patients and to train medical officers in the up-to-date methods of diagnosis and treatment of leprosy. Health officers were also trained to enable them to make a general survey to locate treatment


centres. With a view to accelerate the progress of the work throughout the Presidency the Government sanctioned in 1931 the appointment of five trained leprosy officers to work in groups of districts under the Chief Leprosy Officer. This work proved successful.

In 1938, 455 leprosy clinics were functioning throughout the Presidency. There were twelve segregation centres, otherwise known as Leper Asylums and Settlements. Only infectious treatable cases were admitted in the asylums. It may be of some interest to note that the Government examined the question of isolating lepers by banishment to the Andaman Islands. The proposal was, however, dropped later as similar schemes implemented by the Government of Philippines in 1906 in the Culion Island proved a total failure.

Statistics regarding incidence of leprosy were not recorded and compiled separately in the Madras State. However, assessment of the incidence of leprosy was done often in the past. In the census of 1931, the number of persons recorded as afflicted was 1,47,911 in the whole of India; the quota in Madras State was about 33,000. The incidence was not recorded in the census data of 1941 possibly due to the war.

51 Note of the Chief Leprosy Officer dated 30th July 1938 addressed to the Government of Madras added to G.O.No. 1821, Public Health, 16 May 1939.
52 ibid., p.19.
period. A review of the work done by Government and private organisations in connection with prevention and control of leprosy brought out the fact that no definite policy was being pursued then. Government, therefore, formulated a policy and programme for prevention and control of the disease on broad lines. They were:

(a) Enumeration of the lepers in the census of 1951;

(b) Sanction of capitation grants to leprosy sanatoria, if open cases only are treated;

(c) Night segregation of leprosy patients. Government would give encouragement to private efforts in this direction;

(d) Amending relevant provisions of the Health Act with a view to segregate badly infective cases and to give institutional treatment;

(e) Establishing more sanatoria and open clinics for treatment of non-infective cases;

(f) To impart adequate instruction in leprosy prevention and relief to medical students, Post-graduate training should be arranged. The health staff, ex-patients

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53 ARDPH. 1950, p.48.
in-patients should be trained in leprosy work;

(g) The Hindu Kusht Nivaran Sangh (Madras branch) should continue to do propaganda and publicity with Government grants and that the propaganda of the Public Health Staff should be co-ordinated with that of the Sangh.

An assessment of the incidence of leprosy work was done in the census of 1951 (Table 2.7). The disease was least prevalent in the Deccan and most in South Madras zones. The relative prevalence of the disease in rural and urban areas varies from region to region. The incidence among males was more than that among females, the rate among males being two and a half times that among females. It is not possible to say whether this large variation in incidence among the sexes can be partly explained by difficulties in examining and detecting leprosy among women.

The disease was mainly prevalent in the districts of Ganjam, Vizakhapatnam, Guntur, East Godavari, West Godavari, North Arcot, South Arcot, Salem, Tanjore, Chingleput, Nellore, Chittoor, Madras and Madura in large scale. The disease was prevalent in other districts also but on a small scale.

Research on different problems connected with leprosy

54 ARDPH, 1951, p. 40.

55 G.O.No.3435, Health, 1 November 1952.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of leprosy cases</td>
<td>51,677</td>
<td>20,445</td>
<td>72,122</td>
<td>62,469</td>
<td>9,653</td>
</tr>
<tr>
<td>Population</td>
<td>28,419,003</td>
<td>28,596,999</td>
<td>57,016,002</td>
<td>45,832,268</td>
<td>11,183,734</td>
</tr>
<tr>
<td>Rate per 1000 of population</td>
<td>1.82</td>
<td>0.71</td>
<td>1.26</td>
<td>1.36</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1951.
was continued to be done during the period under study. The important ones financed by the ICMR was for investigation of the effect of the sulphone therapy. In July 1949, the WHO undertook to devote international attention to leprosy. Under the leprosy control scheme of the Government of India three leprosy subsidiary centres that were sanctioned for the control and treatment of the leprosy cases were opened in Madras State during the First Five Year Plan period.

Subsequently, the Government of India modified the scheme as the National Leprosy Control Programme. Under this programme there were two kinds of centres, (i) control unit covering a population of 3 lakhs, and (ii) a Survey-Education-Treatment Centre usually attached to a Primary Health Centre, and covering a population of 15,000. Under the programme there existed static and mobile treatment clinics, so that treatment was made available to patients without their having to travel long distances. The centres under the Control Programme were also engaged in other activities, such as health education, periodic examination of contacts and training of medical and para-medical personnel. Subsequently, the Government also introduced the multi-drug therapy (MDT). It was showing remarkable results.

The people of Madras Province owe a great deal to the pioneering work of voluntary organisations although their
work was initially motivated by compassion for giving succour and some treatment. Actually the Christian Missions were first in the field. These are; Schieffelin Leprosy Sanatorium at Kargiri, North Arcot District, The Belgian Leprosy Centre at Polambakkam, Chingleput District, The Danish 'Save Children' Organisation at Pogri, Andhra Pradesh, The Swedish Mission at Katpadi and the Mission Hospital at Vellore.

Anti-leprosy and special researches in the prevention and control of leprosy in the Province were carried out by the Madras Branch of the British Empire Leprosy Relief Association (later renamed as Hindu Kusht Nivaran Sangh after Independence) which was generally in-charge of the leprosy work in the Province. A rural scheme for leprosy control was under operation in Polambakkam area of Maduranthakam Taluk, Chingleput District.

Another interesting development was the establishment of the Belgium Leprosy Centre in the Chingleput District with financial support from that country. It had followed the pattern of work in respect of surveys, education and training as inogue elsewhere and it had covered nearly 5,00,000 people in 750 villages in three districts of the Madras State which

were highly endemic areas. The centre provided temporary hospitalisation, physiotherapy, and orthopaedic treatment.

The Schieffelin Leprosy Research Sanatorium at Kargiri admitted cases of interest to the surgeon, physician or pathologist, with an eye on research and was doing specialised surgical work including plastic surgery. In addition to the above, a number of voluntary institutions were doing useful work. Some were running colonies and others were running out-patient departments. These institutions were adopting the modern approach to the control of leprosy.

A number of leprosy cases treated in hospitals would give an idea of the relative prevalence of the disease during 1947-1952. The number of cases treated in hospitals are given below:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of cases treated in hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>110,497</td>
</tr>
<tr>
<td>1948</td>
<td>114,583</td>
</tr>
<tr>
<td>1949</td>
<td>66,370</td>
</tr>
<tr>
<td>1950</td>
<td>101,359</td>
</tr>
<tr>
<td>1951</td>
<td>85,262</td>
</tr>
<tr>
<td>1952</td>
<td>91,145</td>
</tr>
</tbody>
</table>


59 *ibid.*, p.257.

60 *ARDPH, 1950*, p.49 and *1952*, p.35.
It is seen that the number of cases treated in the hospitals indicated a downward trend in 1949. The 1952 figures showed an increase over 1949 and 1951 figures. It is clear that the incidence of leprosy did not show any appreciable decline during the period 1947-52. This was due to the fact that no definite policy was formulated either by the Government or by the voluntary organisations for the prevention and control of leprosy during the period under review, until the National Leprosy Control Programme was initiated.

House to house survey was done by trained leprosy inspectors both in Government and voluntary institutions in specific endemic areas. Similarly, for early detection of leprosy cases, school surveys were done in specific areas. The publicity and welfare organisation educated the people through exhibitions, public meetings, radio broadcast, articles in the press, periodicals and pamphlets on leprosy. The Government leprosy institutions were under the control of the Medical Department. The Public Health Department carried out leprosy survey and undertook health education on control and prevention of the disease.

The public are not generally interested in finding out

the real position about leprosy. They recognise a thing only when it comes into their home. The people suffering from leprosy have now realised that it is not compassion or charity they want from the community. They want treatment facilities, acceptance by the society after cure and opportunities to work. Disfigurement need not be a curse, and loss of a limb need not mean loss of living itself. The world is changing. The individual has become the important entity in society. And every leprosy patient is as much an individual as anybody else. The world of leprosy is bound by the common bond of suffering. As tears will not build a new life for them, they have stopped shedding them. It would be a grave mistake on the part of the society to ignore the power of their self-respect.

The organisation of leprosy control has expanded to a great extent with a good number of trained staff and other ancillary service like physiotherapy, reconstructive surgery, training, health education, research, etc., and now it is in a position to achieve the objective of the Government of India to eradicate leprosy from the country by 2000 A.D. The future is, therefore, very bright for the leprosy patients.

**TUBERCULOSIS**

Tuberculosis is a chronic bacterial disease and it has
plagued the world from time immemorial. It may affect any part of the body e.g. lungs, bones, kidneys, lymph nodes, intestines, skin, etc. Poverty, low vitality, over-crowding, faulty nutrition, social customs like purdah, repeated pregnancies and child marriage, lack of timely and adequate medical aid and poor sanitation are some of the causes responsible for the occurrence of tuberculosis. The symptoms of the disease include low grade fever, cough, loss of weight, sweating at night and general exhaustion.

HISTORICAL BACKGROUND

The history of T.B. is long and fascinating. Tuberculosis is probably as old as mankind. The Hebrews were the first people to proscribe the eating of flesh of T.B. animals. Moses must have recognised the hunch back as a T.B. subject, for he forbade him to come within the precincts of the high altar. An examination of some of the Egyptian mummies yielded evidence of the existence of spinal T.B. in Egypt in the Early Dynastic period (3400 B.C.). In the Greco-Roman period, Hippocrates, Celsus and Caecilius Aurelianus had written on T.B. The hymns in the Atharva Veda referred to pathology of T.B. The works of Charaka (1st Century A.D.) and Susrutha (5th Century A.D.)

referred to the chest diseases. But little had been added to the subject for the next thirteen centuries till Dalechambres (1513) described in detail the vertebral caries. Richard Wiseman’s (1672) contribution to surgical T.B. marked an epoch in the history of T.B. With the discovery of tubercle bacillus by Robert Koch in 1882, new vistas were opened for eradicating a scourge that plagued humanity in all its recorded history.

The wasting nature of T.B. and the nutritional status of the T.B. patients is considered to be closely associated with the occurrence of the disease process. The end products of protein metabolism are excreted much more in the urine of active T.B. patients than in non-T.B. people. Disturbances in Vitamin-C metabolism are also believed to be associated with the activity in the disease process.

Nutrition is an important factor that contributes to the body resistance. Various conditions may contribute to the lowering of resistance such as malnutrition or undernutrition, over work and fatigue, alcoholism, vitiated or over heated atmosphere being among the commonest influences at work.

Hence, adequate feeding, rest, avoidance of fatigue, and over-exertion are the fundamental essentials for preventing T.B. infection. The Government of India have recently shifted to a poverty line based on nutritional norms rather than pure income norms. Nutritional value of around 1,500 calories is regarded as basic. There is also stress on eating protein rich foods.

Poor housing facilities, over-crowding, lack of adequate ventilation, and sunlight, unclean water and proper public conveniences and other substandard hygiene conditions contribute to the spread of the disease. The slums have grown very fast in recent times. During pre-Independence period there were only about two hundred slums in Madras city. It has now increased many fold. Minimum basic amenities such as water supply, drainage, lighting did not exist in most of the slums.

The beginning of industrialisation also influenced incidence of T.B. Tuberculosis morbidity at this point got a sudden


spurt due to urban influx, over crowding and consequential unhygienic surroundings. The virgin population moving from villages to towns got infected and succumbed quickly on account of poor resistance and stress and strain. India during the last three decades was passing through the phase of rural to urban migration and consequential health hazards to poor people. 69

Early efforts to fight T.B. were confined to providing treatment or isolation facilities for individual patients and this was largely provided by philanthropic bodies and Christian Missions in hospitals and sanatoria situated usually away in the country side or in hill stations. The treatment usually was regulated life under open-air conditions. No effective drugs were available then. The first concentrated anti-T.B. effort on a nation-wide scale was the organisation of King George V Thanks Giving (Anti-Tuberculosis) Fund in 1929, later merged with King Emperor's Anti-Tuberculosis Fund which formed the T.B. Association of India in 1939.

The Tuberculosis Association has branches in all the States. The Association's objectives are to mould public opinion in favour of anti-T.B. work, to act as coordinating agency to provide a forum for discussion for T.B. workers all over

India as well as to give expert advice on T.B. matters. It has organised the T.B. Seal Campaign which is an annual feature.

It publishes the Indian Journal of Tuberculosis. It also gives financial assistance to deserving T.B. Associations or institutions. Its publications and other activities have contributed a good deal to educate the public on T.B. matters. 70

PREVALENCE AND GOVERNMENT'S RESPONSE

Tuberculosis in Madras State began to pose as a problem in the early years of this century. Paucity of reliable statistics was a handicap in planning T.B. control measures. Inspite of the advances made in the treatment of T.B., it continued to be acute with no perceptible decline in the number of T.B. afflicted persons in Madras State as seen from the number of cases treated in the State during the quinquennium 1948-'52 and the number of deaths recorded in the decade 1941-'50 (Table 2.8). 71 The statement reveals the steady increase in the number of T.B. patients treated. The number of non-pulmonary cases steadily increased three-fold during


### TABLE - 2.8

**THE NUMBER OF CASES TREATED FOR TUBERCULOSIS**

**MADRAS STATE (1948-'52)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Pulmonary Tuberculosis</th>
<th>Non-Pulmonary Tuberculosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td>72,961</td>
<td>27,094</td>
<td>100,055</td>
</tr>
<tr>
<td>1949</td>
<td>79,934</td>
<td>40,075</td>
<td>120,009</td>
</tr>
<tr>
<td>1950</td>
<td>94,708</td>
<td>72,788</td>
<td>167,496</td>
</tr>
<tr>
<td>1951</td>
<td>106,498</td>
<td>64,736</td>
<td>171,234</td>
</tr>
<tr>
<td>1952</td>
<td>126,118</td>
<td>82,647</td>
<td>208,765</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1952, p.34.

### TABLE - 2.9

**THE NUMBER OF DEATHS AND DEATH-RATES FROM PULMONARY TUBERCULOSIS**

**MADRAS STATE (1941-'50)**

<table>
<thead>
<tr>
<th>Year</th>
<th>No.</th>
<th>Rate</th>
<th>Year</th>
<th>No.</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1941</td>
<td>6,418</td>
<td>1.44</td>
<td>1946</td>
<td>6,766</td>
<td>1.38</td>
</tr>
<tr>
<td>1942</td>
<td>6,090</td>
<td>1.34</td>
<td>1947</td>
<td>6,964</td>
<td>1.40</td>
</tr>
<tr>
<td>1943</td>
<td>4,113</td>
<td>0.89</td>
<td>1948</td>
<td>6,995</td>
<td>1.31</td>
</tr>
<tr>
<td>1944</td>
<td>7,246</td>
<td>1.55</td>
<td>1949</td>
<td>7,146</td>
<td>1.31</td>
</tr>
<tr>
<td>1945</td>
<td>6,977</td>
<td>1.47</td>
<td>1950</td>
<td>7,768</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Source: ARDPH, 1950, p.45.
1948-'52. This may partly be due to better diagnosis of the
disease. It will also be seen from the above table that the
mortality rates were steadily high except for 1943.

The diagnosis and treatment of T.B. in Madras State
is free in all Government hospitals and Primary Health Centres.
In addition, there are private hospitals in urban and rural
areas. Facilities are also available for in-patients treatment
in separate sanatoria and T.B. wards of Government hospitals.
As the bed strength are limited, domiciliary treatment was
advocated by the Bhore Committee. The effectiveness of
the domiciliary treatment became considerable on account of
the introduction of chemotherapy.

With the arrival of chemotherapy the natural history
of T.B. has changed. For the first time, specific drugs became
available against tubercle bacillus. The merits of chemotherapy
are that the patients no longer die but are cured. The period
of infectivity is considerably reduced, the relapses are avoided
and chronicity disappears. The patient with drug sensitive
bacilli on proper drugs, taken regularly have excellent chances
of cure in twelve months. A combination of drugs is more
effective than a single drug.

72 Report of the Health Survey and Development Committees,
op.cit., p.105.

73 T.K. Shanmugasundaram, Bone and Joint T.B., op.cit.,
p.38.
The development of resistance to drug is not uncommon with tubercle bacillus as with other organisms. Health experts attending a meeting of the World Congress on Tuberculosis in Bethesda, Maryland, U.S.A., in November, 1992 reported that new strains of T.B. that resist traditional drugs are spreading at an alarming rate and called for new treatment to fight the disease.

In Madras State, the control of T.B. through curative and preventive medical care is under the administrative control of the Medical Department. The Public Health Department, however, carried out educative propaganda in regard to the prevention of T.B. and advising the patients on the necessity for taking early treatment in the nearest sanatoria, clinics and medical institutions. The Government Tuberculosis Institute, Egmore, Madras is incharge of the diagnosis and treatment of cases of pulmonary T.B. It also functions as a T.B. clinic undertaking pre and post-sanatorium treatment, education of the patients and their contacts, B.C.G. vaccination campaign, mass X-raying. Periodical check up of arrested cases of T.B. is also done.

The Institute is a training centre in T.B. for post-graduates, under-graduates of medical colleges, health visitors.

The Institute also supervises the work of the staff of the four T.B. clinics in the four Government hospitals in the city namely, Government Stanley Hospital, Government Royapettah Hospital, Government General Hospital, and the Kasturba Gandhi Hospital. The Institute was also investigating about the efficiency or otherwise of domiciliary treatment of tuberculosis with the new oral drugs, so as to assess whether these drugs could be used as public health measure to control tuberculosis in the country, without the necessity of providing institutional treatments.

In a long-standing disease when the patient can infect many and for long, the most effective measure which will quickly secure a reduction in the incidence and mortality from T.B. is the provision of sufficient number of beds for the isolation and treatment of open cases. The beds available for T.B. cases were distributed in eleven sanatoria and twenty two general hospitals of the State. Of the sanatoria, three were maintained by the Government, one by the Corporation of Madras, three by missionary bodies, two by District Associations, one by the Railways and one was a private

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75 G.O.No.1608, Health, 9 May 1951.

76 ARDPH, 1952, p.34.

sanatorium. For the northern districts there were three sanatoria. The total bed strength available for cases of T.B. in Madras State was about 2,000.  

Under the National T.B. Control Programme a separate cell was established at the Directorate of Medical Services under a State T.B. Officer to assist the Director in Technical Planning and Supervision of T.B. Control Programme. He maintained a close liaison with the District T.B. Centres, etc. A Tuberculosis Centre was established in each district with all the facilities of diagnosis, laboratory, X-ray appliances and adequate facilities for treatment. Other functions include BCG vaccination and coordination of the activities of all chest clinics in the district. The rural units, viz., the primary health centres were entrusted with the job of case finding. Cases requiring further treatments were referred to the chest-clinic or the District T.B. Centre.  

B.C.G. Vaccination

The most advocated T.B. preventive measure is B.C.G. vaccination of the tuberculin-negative persons. The idea behind B.C.G. vaccination is that the introduction of this wholly
benign infection into a subject makes him tuberculin positive and guards him against possible mass infection. In other words, specific defence mechanism to oppose T.B. is roused by the B.C.G. vaccination. In the human trials B.C.G. has not proved as successful as smallpox vaccination. B.C.G. was introduced in India in 1946 and in Madras in February 1949.

It would be interesting to note in this connection the great controversy that C. Rajagopalachari (Rajaji) led, opposing the use of B.C.G. in India. His argument was that if B.C.G. has not been accepted for universal trial in developed countries, the intention of the other countries and their research workers was to make Indians guinea pigs for the trial. His argument was in defence of the people going to be exposed to a vaccination which had not had world-wide acceptance. Rajaji's was a lonely voice. The Government of India, however, went ahead with the experiments and the B.C.G. laboratory was built in Guindy, Madras.

B.C.G. is being used on infants soon after birth in Government hospitals. Research on large communities indicates


that B.C.G. has a definite effect in preventing infantile mortality due to T.B. but after five years of age it hardly has any effect in reducing infection rate. B.C.G., therefore, is not the only answer to the problem. It is not a weapon that could aid substantially the eradication of T.B. nation wide. B.C.G. vaccination should not in anyway deter or hinder the other well accepted methods of tuberculosis control. In fact, B.C.G. should be an adjunct to them.\(^{83}\) New born babies living in a society exposed to heavily infected atmosphere would do well to have the vaccination to protect themselves from contracting fatal forms of infantile T.B.\(^ {84}\)

**INTERNATIONAL PARTICIPATION**

In the world of today with quick travel systems no man is safe from communicable diseases until all men are safe from them. It is for this reason that the task of controlling the communicable diseases has become an international one. In this sense T.B. is a world wide problem. Therefore, the International Organisations like WHO, UNICEF, Red Cross Society and the International Union Against Tuberculosis are undertaking anti-T.B. activities in India as well as in the other countries of the world. The first T.B. control projects were assisted


\(^{84}\) M. Senthosam, *Tuberculosis at a Glance*, p.106.
by WHO in 1948. Its various contributions were mass B.C.G. vaccination, T.B. demonstration and training centres, pilot studies in domiciliary chemotherapy, prevalent surveys and research. 85

UNICEF is providing equipment and service for miniature X-ray examination, laboratory diagnosis and tuberculin testing for B.C.G. vaccination and for statistical work. For pilot areas, UNICEF provides drugs for all cases and potential cases of T.B. Other forms of assistance are transport and stipend for training of staff. 86

The participation of Red Cross Society in the campaign against T.B. dates back more than half a century. In 1907 the VIII International Conference of the Red Cross declared T.B. as a global problem and decided to take part in the campaign against T.B. in times of peace. The Red Cross generally undertakes its anti-T.B. work within the fields of education of the masses, participating in the treatment and social service. It is capable of placing at the disposal of this Education Programme, its numerous volunteers who not only take part in the campaign but act equally as propaganda.


agents in their own families and respective social circles.\textsuperscript{87}

The \textit{International Union Against Tuberculosis} mobilises the world opinion for the conquest of the disease. Leading specialists in all aspects of T.B. in all parts of the world and research workers in T.B. from a great number of countries serve on the Union's Technical Committees.\textsuperscript{88}

One of the important measures for control of T.B. is case finding. Case finding will defeat itself if it is not combined with relief. Clinical treatment may not be popular. Domiciliary treatment may not be easy. In these and in the follow up work, a close link should be established between the home and the clinic. This can be done only if the institutional and the field work are under a single direction. This is all the more necessary as we may have to depend, for sometime to come, more upon clinic than upon hospitals or sanatoria.

Tuberculosis long known to be a major cause of morbidity and mortality throughout the world, has for the past several

\textsuperscript{87} The Bureau of Health and Social Affairs of the League of Red Cross Societies - Participation of the Red Cross in the Campaign against T.B., \textit{Bulletin of the Union Against Tuberculosis}, Vol. XXXIII, 1963, p.81.

decades been a neglected disease in both industrialised and developing countries. However, it is now attracting renewed interest and significant efforts to revive control activities are currently underway. 89 WHO has recently declared that T.B. is a global emergency, saying the disease will claim more than 30 million lives in the next decade unless immediate action is taken. WHO has pointed out that once believed to be under control, T.B. is spreading world wide because of the emergence of drug-resistant strains, changing research priorities and the link between T.B. and HIV (the virus leading to AIDS). 90

MALARIA

Malaria is classified as an infectious disease caused by the sporozoan parasite carried from man to man and transmitted by the bite of an infected female anopheles mosquito. Periodical fever, chill, spleen enlargement and anaemia are some of the apparent characteristics. The disease is considered to be one of the most important diseases affecting human beings and thereby hampering the progress of developing countries.


Anopheles, a variety of mosquito, is the principal carrier of malaria.
HISTORICAL BACKGROUND

The name malaria has been derived from two Italian words mala-bad and aria-air. Malaria has been described by the Indian Physician Charaka and Surgeon Sushruta as remittent fever caused by an external agent. Reference to the disease has also been made in Atharvaveda. In the 5th Century B.C. Hippocrates in Greece was able to describe clinical malaria. Then, in the 2nd Century A.D. Greek and Roman physicians were able to describe about malaria. In 1880, Larvane a French military surgeon, discovered malaria parasite in blood. In 1897, Ronald Ross discovered malaria transmission through anopheline mosquito. In 1820, two French pharmacists isolated alkaloids quinine and cinchonine from Cinchona park. In 1924, Dr. Schulemann and his colleagues produced quinine synthetically in Germany. The first synthetic anti-malarials were followed by Chloroquine (1934) progunail (1945) and primaquine (1950). Subsequently, many other combinations of anti-malarials were prepared.

In 1899, Ross introduced anti-larval measures. During 1935-'39, the use of pyrethrum spraying in control of rural malaria was introduced in India, South Africa and Netherlands. Paul Muller discovered the insecticidal properties of D.D.T. Venezuela was the first country to start national malaria control.91

91 S. Bhargava, Concept of Malariology, (Bikaner: ALF Publisher and Distributors, ), pp.8-9.
PREVALENCE

The number of deaths from malaria registered during 1950-52 are as below: 92

<table>
<thead>
<tr>
<th>Year</th>
<th>Death from Malaria</th>
<th>Death Rate for 1000 of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>6,224</td>
<td>0.11</td>
</tr>
<tr>
<td>1951</td>
<td>5,389</td>
<td>0.09</td>
</tr>
<tr>
<td>1952</td>
<td>6,459</td>
<td>0.11</td>
</tr>
</tbody>
</table>

The mortality from malaria formed 3.2 per cent of the total deaths from fevers inclusive of malaria. It is not possible to say how far this represents the true situation as most of the village headmen who are the Registrars of Deaths in Rural Areas are not likely to have differentiated malaria from other fever cases.

GOVERNMENT'S RESPONSE

In India, a Malaria Commission was appointed by the Royal Society for investigating the possibilities of malarial control in one area near Lahore. After conducting many trials, the Committee concluded that under the prevailing conditions it was not possible to control malaria by adopting anti-mosquito measures. The Imperial Conference held at Simla in 1909

recommended for setting up a permanent organisation for the control of malaria. Accordingly in 1910, the Central Malaria Bureau was established which was later renamed as Malaria Institute of India, and finally as the National Institute of Communicable Diseases.

Anti-mosquito measures were taken in 1936 by using pyrethrum. Subsequently, in 1945 D.D.T. was used as an insecticide. Its use proved very effective in rural and urban areas. The Health Survey and Development Committee of India recommended in 1946 the establishment of anti-malarial organisations throughout the country in collaboration with the Malarial Institute of India. In 1951, the Planning Commission of India emphasised the need for implementing Malaria Control Programme all over the country. A comprehensive programme was prepared with the help of State Malarialogists, WHO, UNESCO, etc.

The National Malaria Control Programme was introduced in 1952. This scheme was subsequently modified as National Malaria Eradication Programme. The principles of malaria control methods was (a) removal of the conditions which make possible the breeding of mosquitoes, (b) destruction of the mosquito at some periods of its life, i.e., during the larval or adult stage, (c) preventing man from mosquito bites, and

(d) attack on parasite as and when it circulates in the human blood.  

The National Programme was a phased one. In the first phase, called the "attack" phase, emphasis was on insecticidal spraying to interrupt the transmission and occurrence of fresh cases. After a period of two to three years, when a prescribed standard of operational success was attained, it advanced into the second phase that is 'consolidation' phase. In this phase screening of fever cases and collection of blood smears from fever cases were mainly done to detect the presence of malaria surveillance activity, thus continuing for about three to four years. When the number of cases were reduced drastically the programme would be allowed to pass on to the next and final phase, called the "maintenance" phase, when a very close vigilance would be required to be kept on any sporadic malaria cases. The special staff appointed in the first phase would be withdrawn in this phase and vigilance would be required to be maintained by the regular staff at the Primary Health Centre level.  


Anti-malaria work was extended to all parts of the Madras State excepting the more remote parts of the Agencies and a few hilly areas rather difficult of access. The State Malaria Organisation is the most broad-based and well organised in the country. Apart from control, the organisation is equipped for malaria surveillance, prevention, and research.

During the period of this study there were 36 individual anti-malaria schemes functioning in different parts of the State. 96 Eleven of these were for improvement of areas for land colonisation and development. It is well known that malaria has a considerable adverse effect on agriculture, industries and transportation and interferes with education and social welfare. The anti-malaria control measures eliminate these handicaps and add to the sum of human happiness and progress. Large tracts of virgin country have been opened out for cultivation affording new work to many and producing more food for the country.

Four other schemes were operated in multi-purpose project areas. By close watch on labour, by avoidance of creation of actual or potential breeding places of mosquitoes and by preventive D.D.T. spraying programmes, malaria was kept out of these areas. 97 Other schemes tackled local malaria

97 G.O.No.3434, Health, 1 November 1952.
problems created by the prevalence of carrier mosquitoes or their infiltration from sources outside the State. Adequate provision was made for the control of malaria in rural or urban or in endemic or epidemic areas.

A Central Malaria Laboratory and Museum functioning in Madras was intended for the training of Public Health Officers and the Officers selected for manning the different schemes. Courses of lectures and demonstration in advanced malariology were arranged. The laboratory was well equipped. The four Regional Malaria Organisations with headquarters at Coimbatore, Tanjore, Bellary and Vizakhapatnam functioned well. Each organisation was incharge of a group of five to seven districts. The staff visited malarial and filarial areas of local bodies to study or obtain a clearer understanding of local problems. They surveyed local areas and prepared schemes for mosquito control, malaria or filariasis control for implementation by local bodies. They inspected areas where sanctioned schemes were working to see and certify that they were worked on right and approved lines. Technical advice was also offered for improving the schemes.

METHODS OF CONTROL

Use of D.D.T. as residual spray had already demonstrated

the economic feasibility of statewide malaria control: Apart from its effect on mosquitoes, its action on other diseases carrying insects, as flies, fleas, pests, etc., added to its popularity. D.D.T. was sprayed in the form of water emulsion with aromex or soap or as wettable powder suspended in water.

FREE QUININE DISTRIBUTION

Quinine is effective against all forms of malarial parasites. The scheme of free quinine distribution was in force in some villages. There were 5,884 authorised agents appointed for the distribution consisting mostly of village headmen, school teachers, voluntary social workers and officers of the rural welfare and cooperative departments. The departmental staff also continued to be actively engaged in this work.

The National Malaria Control Programme was extended to Madras State. Under this programme provision was made for extending anti-malarial work to all the affected areas in the State. Government contributed half the cost of malaria control schemes, one-third of the cost of filaria control schemes and one-fourth of the cost of mosquito control schemes undertaken by the local bodies. This had been of substantial

100 G.O.No.1169, Health, 4 April 1951.
101 ARDPH, 1949, p.31.
assistance in extending control operations to all affected localities.

The purpose of this study is to explain the nature and prevalence of important notifiable diseases such as cholera, smallpox and plague, social diseases like tuberculosis and leprosy besides malaria and to bring the Government's approach towards preventive and control aspects of the health care. During the pre-Independence period much attention was not paid to the public health care. Only after Independence and particularly with the introduction of the First Five Year Plan, Government took various initiatives against preventable diseases. But the initiative was limited largely by financial, organisational, and administrative constraints. Poverty, illiteracy, overcrowding, unhygienic surroundings, and lack of public co-operation contributed in no small measure to the morbidity and mortality due to these communicable diseases.

From the analysis of the various communicable diseases it is apparent that man has made progress in his battle against infectious diseases. The war against these diseases is never ending. If efforts were to slacken, it would not by a generation before death rates from these diseases would begin to creep upward again. The battle against infectious diseases goes on day in and day out. Research must find answers to many problems and questions as yet unsolved. In the meantime,
communities employ the knowledge, methods, and techniques now available and thus hold the incidence of infectious diseases to a practical minimum. In this connection one would remember the popular saying that eternal vigilance is the price of freedom from communicable diseases.