

THE OBSERVATION REPORT
ON
INFECTIOUS DISEASES IN SRILANKA

January 1985

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P R E F A C E

In view of the fact that the control of infectious diseases is an important subject in the health sector of the developing countries, the Japan International Cooperation Agency decided to conduct a basic study on the present state of infectious diseases in Sri Lanka as one of its activities for 1984.

The Agency entrusted the contract works to the International Medical Foundation of Japan and sent to Sri Lanka, a study team with four members headed by Dr. Ryosuke Murata, Consultant to the Foundation, from August 8 to September 10, 1984.

The study team exchanged views with the officials concerned of the Government of Sri Lanka, and conducted a field survey in Colombo and other parts of Sri Lanka.

After the study team returned to Japan, the data obtained from the field study were analyzed and the present report has been prepared.

I hope that this report will be useful for the further promotion of Japan's health and medical cooperation with Sri Lanka, in particular, in identifying appropriate cooperation projects by JICA with Sri Lanka.

I wish to take this opportunity to express my deep appreciation to the officials concerned of the Government of Sri Lanka for the active cooperation and kind hospitality extended to the study team.

January 1985

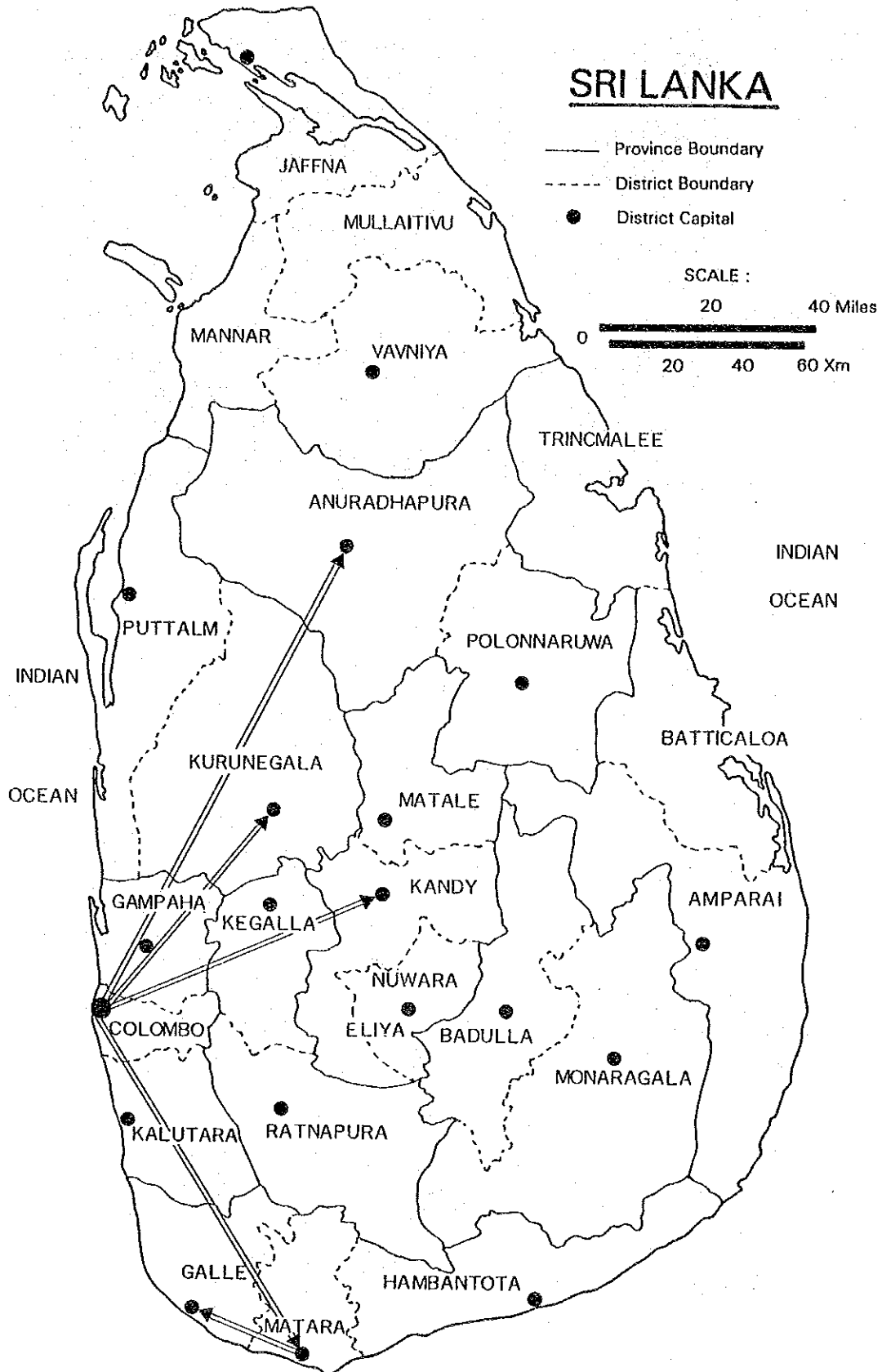


Noboru Nakahira,
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Acknowledgement

The JICA/IMFJ observation team gratefully acknowledges the kind co-operation given by a large number of Sri Lanka authorities concerned with the health services. Without their devoted help the team would not be able to complete their observations within such short period. The team particularly wishes to express its sincere gratitude to cordial treatments and receptions given by honourable Secretary of Health Mr. L. Panambalana, Director General of Health Services; Dr. S.D.M. Fernando, Deputy Director General of Health Services; Dr. Mohan Rodrigo, Dr. George Fernando, Epidemiologist; Dr. A.V.K.V. De Silva and other excellent members.

DISTRICTS SURVEYED





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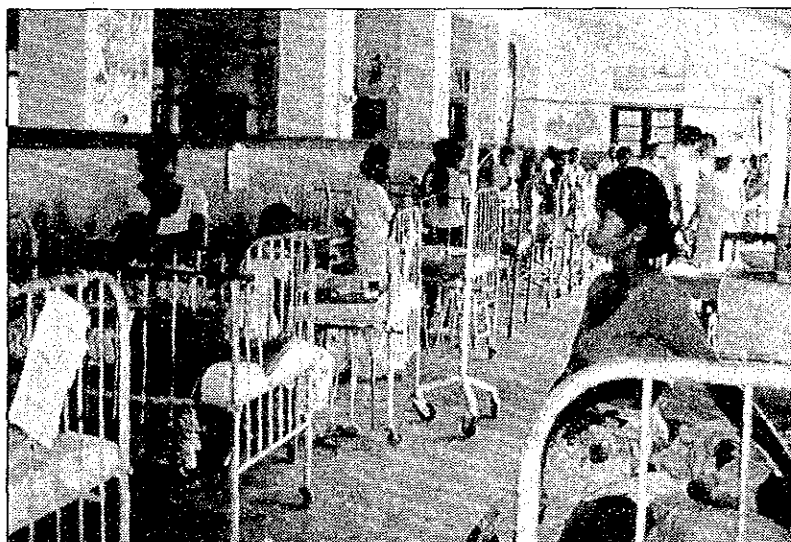


Hospital



Peradeniya Teaching Hospital, Kandy

Peradeniya Teaching Hospital





Rural Hospital



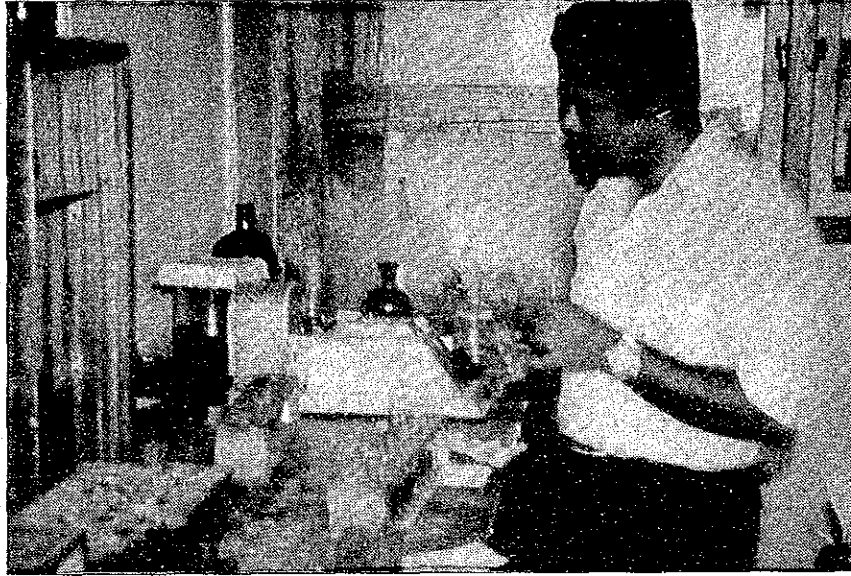
General Hospital Laboratory



General Hospital

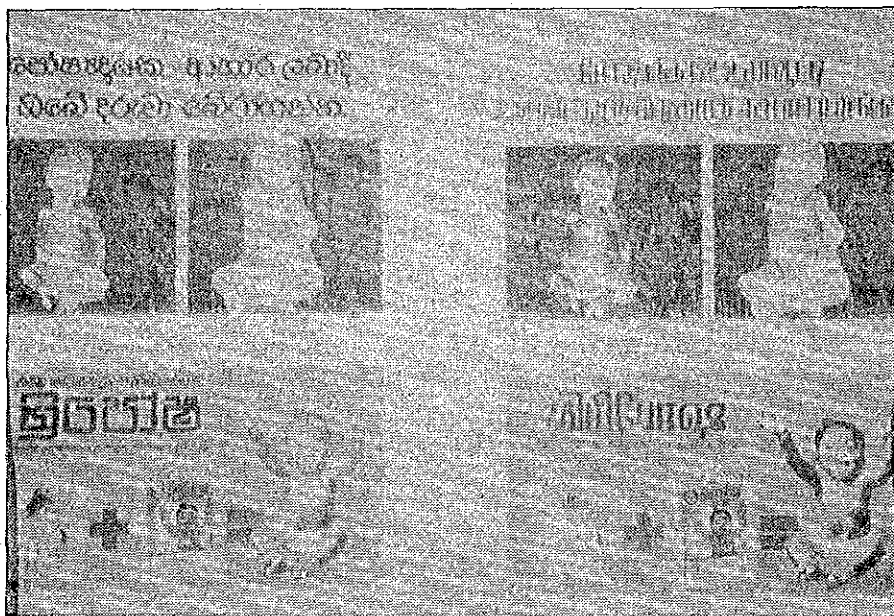


Laboratory



General Hospital Laboratory

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Introduction

Summary and Japan's future assistance

A survey team on infectious diseases visited Sri Lanka's capital, Colombo, as well as five other regions, Anuradhapura, Galle, Kandy, Matara, and Kurunegala for 36 days between August 6 and September 10, 1984, in order to study the actual state of infectious diseases in the country and the measures needed to be taken against them. The team visited departments of the Ministry of Health, regional medical centers, medical laboratories, medical colleges, hospitals, public health centers, as well as other medical institutions, collected documents, and had discussions with officials of the above institutions.

1. The Actual State of Infectious Diseases in Sri Lanka

Health statistics in Sri Lanka are obtained by the following means:

- (1) Registers of births and notices of deaths are sent to the Department of Census and Statistics by hospitals and the registrar of one's place of residence.
- (2) Reports on the hospitals' in-patients are sent to the Ministry of Health's medical statistician.
- (3) Information on reported infectious diseases (18 types) is sent by medical and health institutions to the Epidemiological Unit via the Health Unit.
- (4) As far as the 7 diseases (6 types of infectious diseases plus cancer) against which special measures are needed to be taken are concerned, statistics are compiled by different means for each type. And, excepting cancer, reports on infectious diseases are passed on to the Epidemiological Unit.

Concerning the reliability of such reports, then rise the problems that registrars who are employed at the outside of hospitals have not received any medical education and that laboratory examinations which mean to support diagnoses are not satisfactorily held. Moreover there is such

a great difference among the means used for the reports, in some cases, it is difficult to grasp the actual state of the diseases.

Nevertheless, though Sri Lanka has statistical problems, we got the impression that its disease pattern was somewhat different compared with other Southeast Asian countries despite similar economic situation. For instance, the frequency rate of infectious diseases and the causes of infant mortality in Sri Lanka are lower than the other Southeast Asian countries (Table 1), the number one cause of death being circulatory diseases, which amount to 22% of all causes of death (Table 2). Infectious diseases are the number two causes of death, amounting to 14 % of all causes of death. And even if we were to include pneumonia, whose rate is high in all of the countries, it amounts to merely 23% of all causes of death, a rate lower than that of Indonesia (1980) and the Philippines (1979), which amounts to 58.8% and 36.8% respectively. It may be stated in this connection that traumas and intoxication (13.4% of all causes of death) are the number three causes, while perinatal deaths (10%) are the number five causes. Moreover, the mortality rate due to tuberculosis in 1979 was 9.2 (out of 100,000), lower than that of the Philippines (60.6) and Thailand (15.1) of the same year, and was actually close to that of Japan (8.5). As there are few plasmodium falciparum, there has as yet not been any drug-resistant malaria, and as presumptive treatment has shown to be effective, death rate due to malaria has been low. Yet there are differences depending upon the report. Of the intestinal infectious, the diarrheal disease which is considered the main cause of death varies according to the report (Table 3). It is not particularly lower than that of Indonesia and the Philippines.

The infant mortality rate of 34.4 (1980) is lower than that of Indonesia (93 in 1981) and the Philippines (55 in 1981). Nevertheless, some researchers from USAID expressed a doubts as to the reliability of such numerical factors.

The average life expectancy announced in 1980 increased to 69 years of age, which is much higher than that of Thailand (63 years of age in 1980), whose individual income is 3 times as such as Sri Lanka. (Refer to the Annual Average Life Expectancy, 1980: India 52, Indonesia 53, The Philippines 62, and Malaysia 64) (Table 4). The authorities of the Ministry of Health give the

following reasons for Sri Lanka's satisfactory health conditions as compared with other developing nations, even with its low income:

- (1) Primary Health Care (PHC) system is well-prepared, and attentive care is provided to pregnant women, newborns, and young children. Moreover, there is a possibility of detection and treatment of general diseases during their initial stages.
- (2) Medical care is provided free of charge, and there are medical facilities within 5 miles of each residential district.
- (3) The spread of compulsory education has made it easier to introduce health education.
- (4) The development of the transportation system has greatly helped to conduct PHC activities and to enable patients to visit hospitals much more easily.

According to the above statements, the mortality rate due to infectious diseases as a whole seems to be low. Yet when the morbidity rate is examined, developing nations in tropical regions show their particular characteristics. The principal diseases which exist are: intestinal infections, such as acute diarrhea, as well as parasitic diseases, malaria, hepatitis, measles, filariasis, and tetanus (Table 3). Leprosy and rabies have also become common, and there is an annual occurrence of hundreds of patients. Furthermore, malnutrition has become an important medical topic (Table 5), shows the changes of the main infectious diseases. There are no differences in the morbidity rate of intestinal infections, such as acute diarrhea, compared with that of Indonesia and the Philippines (Table 6). Moreover, there are frequent occurrences of amebic dysentery in certain areas, add many cases of death due to amebic liver abscesses. The morbidity rate of intestinal parasitic diseases, caused by roundworms and hookworms, is high, and more than 80% of those living in agricultural areas contract some type of disease due to intestinal parasites. There was a prevalence of hepatitis in 1975-76, and although there has recently been a tendency towards a slight decrease, there still is an annual morbidity rate of 30-40 cases. This may be the reason for the increase in the occurrence of intestinal infections. Although the morbidity rate due to hepatitis is high, the mortality rate is 15.4, a rate lower than that of the Philippines. The low morbidity and mortality rates due to tuberculosis, and the great number of

aged persons among the patients, may be compared with the state of industrially advanced nations.

As a result of the aid given by WHO and UNICEF to spread the use of vaccinations, Sri Lanka has been able to decrease the number of EPI cases before Thailand, Indonesia, and the Philippines have been able to. Thus, diphtheria has declined sharply and has become an uncommon disease. Though one step behind, the number of cases of pertussis has also clearly decreased. The decrease in the number of tetanus cases among newborns is most probably due to the improvement in care given during delivery and in vaccinations. The morbidity rate due to acute poliomyelitis also reached its lowest (0.4) for the first time in 30 years in 1983. Nevertheless, in order to see if this tendency will continue, it will be necessary to keep making observations during the next few years. As for the use of vaccinations against measles which have not yet been widely spread, a high morbidity rate of 87.4 was observed in 1982, and there have been repetitive outbreaks every 2-3 years. The mortality rate (0.1) is lower than that of the Philippines (this may be due to problems existing in the diagnoses). Immunization against measles was begun in 1984.

According to the total number of patients released by hospitals, the morbidity rate of sexual diseases is high (253.7 in 1979). The number of syphilis cases has clearly decreased (a morbidity rate of 5.4), but that of gonorrhoea is high (24.5 in 1982). Moreover, there have been no changes in the frequency rate of non-gonorrhoeal urethritis nor soft chancre, but rather there have been increasing occurrences of Inguinal (genital) herpes in the public region. Special measures against sexual diseases have been designated, but the small budget hinders the possibility of diagnoses and treatments.

Although malaria was almost completely eradicated around 1963 in Sri Lanka, it has tended to recur in recent years, and has become an infectious disease with a high morbidity rate (Table 7).

Although there are several arguments concerning the causes of this recurrence, generally speaking, the following may be considered the causes:

During the second half of the year 1967, in order to develop the jungle regions in the central or northern central part of Sri Lanka, many labor workers settled in the jungles, and there developed vivax malaria. At the same time, gems were discovered in Elahera, a region southwest of Polonnaruwa, and many came to exploit the region. During this period, a monsoon struck the region which resulted in the production of pools or ponds. Anopheles which occurred in the pools acted as vectors to the malaria parasites already existing in the labor workers' bodies and from there were transmitted to other human beings. As the infected labor workers and gem dealers migrated from one region to the next, the infections became widely spread. The disease was also spread throughout the island by Buddhists who went on pilgrimages.

Although according to documents held by the Anti-malaria Campaign (1978) the mortality rate of malaria is 0.01, the mortality rate of the total number of in-patients is an actually much higher one of 0.98 - 0.21. Although filarial cases, against which special measures are taken, are restricted to the southwest coastal regions, and its morbidity rate lower than it was previously, the infection rate due to microfilaria in the affected regions is still 0.2. Fortunately, there have been fewer cases in which diseases, such as elephantiasis, have caused functional disorders, but it is evident that if measures are slackened, the disease will recur. Although there has been a decrease in the number of rabid cases since 1974, 135 cases were still reported in 1982. Although special measures have been designated against leprosy, the number of registered patients totaled 10, 232, that is to say, 69 patients per 100,000 population.

As malnutrition is considered to have an influence on the various infectious diseases, it is being treated as a health topic in the country. Malnutrition among pregnant women and young children is especially a problem, and it has been said that malnutrition of all types among young children less than 6 years of age amounts to a regional average of about 37% (Am. H. 1983, Sri Lanka). The nutritional state of babies depends upon that of their mothers. In 1982, 330.7 cases of anemia were observed out 100,000, with a mortality rate of 3.0, but most of the deaths due to anemia were by the mothers. There is a close connection among nutrition, anemia, and infectious diseases (including parasitic diseases).

Although when we observe the conditions for the occurrences of infectious diseases and their annual changes as a whole, we notice problems in dealing with them, we may nevertheless allow ourselves to state that the health situation in Sri Lanka is a mixture between that of developing and developed nations.

We will now discuss the regional distribution of the principal infectious diseases. Figure.1 and Table.8 shows the causes of death due to infectious diseases by region. The number of deaths due to infectious diseases is high in the southeastern coastal regions of Batticaloa and Amparai, followed by Kandy, Mannar, Anuradhapura, and Ratnapura, while it is low in the regions of Vavuniya, Kegalle, and Polonnaruwa. With the exception of Kandy, infectious diseases are the number one or number two causes of death in regions where there are high occurrences. In most regions, the number one cause are circulatory diseases or traumata (mostly due to traffic accidents).

Diarrheal diseases are considered the main causes of death among infants, and Nuwara Eliya (mortality rate of 80), Badulla (64), Kandy (61), Ratnapura (55), Kalutare (41), and Colombo (40), are the regions with the highest mortality rate. And deaths due to malnutrition exist in Badulla (21), Nuwara Eliya (18), Kandy (14), Monaragala (14), as well as in Ratnapura (13), where there is a high mortality rate among infants. In this connection, regions in which there are many cases of circulatory diseases are Colombo, Kandy, Badulla, and Nuwara Eliya. There are many cases of respiratory diseases in Nuwara Eliya, Kandy, Badulla, and Batticaloa, and delivery disorders in regions such as Nuwara Eliya, Badulla, Kandy, and Ratnapura. By examining the case distribution, we may assume that the health situation in the central southern mountainous regions and the southeastern coastal regions is unsatisfactory.

Table 8 shows the distribution of the principal infectious diseases. There is a high occurrence of acute diarrheal diseases in Vavuniya, Ratnapura, Matara, Batticaloa, Colombo, and Kurunegala, and a high morbidity rate of more than 500 cases may be observed in other regions. In fact, in areas such as Batticaloa, Kurunegala, and Matara, the rate has increased over the past 10 years. The frequency of bacterial dysentery has

also increased over the past 10 years in Kegalle, Kandy, Matara, Moneragala, Badulla, and Batticaloa.

Enteric fever (mainly typhoid fever) occurs frequently in Badulla, Newara, Eliya, Moneragala, Kandy, Ratnapura, and Batticaloa.

Intestinal infections seem to be localized, and the central southern regions and southeast coastal regions are considered contaminated areas. There is a low frequency rate of acute diarrheal diseases in Vavuniya, but documents we presently have on hand do not give us the reasons for this frequency.

Except for a small portion of the southwestern region, malaria is an epidemic disease. In the basins of the Dedura Oya and Maha Oya, there are a number of high frequency zones.

Filariasis caused by *Wuchereria bancrofti* centers around densely populated areas of the southwestern coastal regions. Thus it presents a belt-like distribution. Until the 1950's, there was a prevalence of *Brugia bancrofti* in the central northern regions, but at present no cases have been detected.

Although no nationwide surveys on intestinal parasites have been conducted, and no special densely prevalent areas are known, in agricultural areas other than in the urban communities, a high frequency of infections caused by roundworms and hookworms have been observed.

There is a high frequency of malnutrition in Vavuniya, Moneragala, Anuradhapura, Amparai, Ratnapura, and Kegalle. Moreover, cases of anemia are seen in Amparai, Badulla, Matale, Anuradhapura, Monegale, and Kurunegala. Most of these areas are either malarial-infected or have a high frequency of malnutrition.

There is a high frequency rate of tuberculosis in Colombo, Batticaloa, Kalutare, Amparai, Kegalle, and Jaffna, and is concentrated in the southwestern and southeastern coastal regions. The frequency is low in Badulla and Moneragala, where there is a high frequency of intestinal infections.

There is a high prevalence of leprosy in the southwestern coastal regions, such as Gampaha, Colombo, Kalutara, and Matara, and in the southwestern coastal regions, such as Amparai.

A high occurrence of tetanus is found in Batticaloa, Matale, and Puttalam, and excepting Batticaloa, they are all agricultural regions in the northern central part of the country.

2. Measures to Control Infectious Diseases

The high morbidity rate due to infectious diseases has attracted the attention of the Sri Lanka government, which has devised to carry out various measures against the diseases. These countermeasures may be classified into general and specific countermeasures.

2.1. General Countermeasures

2.1.1. System for the notification of infectious diseases

In order to grasp the actual state of infectious diseases, 18 different cases were designated and reported to the Department of Epidemiology of the Ministry of Health every week. However, the examinations did not always support the diagnoses.

2.1.2. The increase in the number of services towards the improvement of environmental hygiene

Through the government's budget and cooperative funds by foreign countries, the Sri Lanka government has set up facilities and toilets. It has granted a subsidy for toilet facilities to those in the low income bracket, and its number reached 18,700 in 1983. Moreover, with the collaboration of the Medical Research Institute, examinations of the quality of water were begun. However, it will take time to improve the system of water quality control.

A law concerning the management of food was enacted in 1981, and a large number of supervisors (in the field of food products and public

health) for control of food have been trained since 1982.

2.1.3. Facilities for Primary Health Care

The Primary Health Care system is well-organized in the provinces, with immunization and treatment services being independent from one another. Immunization-related services deal with child and maternal health, school health, family planning, and nutrition. 95% of the residents can take advantage of the medical facilities, situated 5 miles within their residential districts, free of charge. For nutritional improvement, pregnant women and infants are provided with special food.

Although at present, treatments and immunization are independent services, reform measures for the Health Care Delivery System were set up in 1983. In the subdivisional health centers, immunization and treatment services will no longer be independent from one another. That is to say, in the provinces, a Primary Health Care Complex designed to incorporate immunizations and treatments will be established, in addition to 3-phased centers, as in the following.

Gramodaya Health Center (population coverage of 3,000),
Subdivisional health centers (population coverage of 20,000),
and Divisional health centers (population coverage of 60,000).

2.2 Specific Measures

2.2.1. Measures against specific cases

Measures against special cases go under a program known as the "Vertical Program". Of the 7 measures, 6 are concerned with infectious diseases: the Anti-Malaria Campaign, the Anti-Tuberculosis Campaign, the Anti-Filariasis Campaign, the Anti-VD Campaign, the Anti-Leprosy Campaign, and the Rabies Control Program (the 7th program is related to cancer). The head offices of these countermeasure programs, located in Colombo, and the branch offices, located in regions where the diseases occur frequently, are where cases are discussed and treatments given.

2.2.2. Vaccinations

In accordance with the EPI imposed by WHO, vaccination is carried out. According to 1982 statistics, the percentage of immunization against DPT and OPV was 56%, against tetanus toxoid 47.1%, and more than 90% against BCG at the medical centers. In 1984, immunization against measles were carried out in certain areas.

3. Problems involved in the Measures against Infectious Diseases

Sri Lanka's medical service system, which placed emphasis on Primary Health Care (PHC), was well-organized, and helped decrease the mortality rate. However, the morbidity rate due to infectious diseases remained high, and applied common to all developing nations prevailed. Thus, as a counter-measure, authorities of the government are making utmost efforts to improve the Primary Health Care system. In order to improve health conditions, it will be necessary to solve the following problems:

3.1. Lack of personnel, especially those in charge of medical care, as well as scientists in the various fields related to the Ministry of Health.

3.2. Facilities of the Institutes dealing with Experimental Studies

At the medical institutes, diagnoses of infectious diseases are mainly clinical ones, which are not satisfactorily supported by laboratory tests. Such tendencies are seen especially at the subdivisional centers. At present, it is difficult to grasp the actual state of infectious diseases, to give treatments suitable for the causes of the diseases, and impossible to plan preventive measures.

The Medical Research Institute (MRI) is an institute that deals with laboratory researches, but the facilities are obsolete and there is a lack of personnel. In order that MRI supports the medical administration as a medical laboratory and fulfills its role as a referral laboratory for the laboratories of the country's medical centers, it will be necessary to reemphasize the functions of the institute by modernizing its facilities and introducing new technology. Moreover, it will be necessary to provide regional laboratories with the necessary equipment, reinforce the nationwide

examination system centered around the MRI, support clinical diagnosis, and provide epidemiological information with a scientific backing.

As the state of infectious diseases depends upon changes in the environment and the style of living, it is necessary to conduct studies in accordance with these factors. Moreover, in order to improve treatment methods and immunization measures, it is necessary to carry out experiments which will introduce new technology. Thus, the MRI must urgently take action as an institute which can realize such studies. And in order to achieve this, equipment, as well as personnel are needed.

3.3. Vaccination Measures

Vaccinations related to EPI are often carried out, and the number of diphtheria, whooping cough, and tetanus cases have decreased. However, the country depends most of its supplies of vaccines on UNICEF, yet because this aid is scheduled to end in 1987, it will be necessary to consider other measures in the future. The Ministry of Health is considering a budget of \$300,000, but this is only half the amount of the budget set aside for vaccinations for the fiscal year 1982.

The personnel in charge of vaccine productions at the MRI is considering importing concentrated vaccines to dilute and bottle their own vaccines in the future, but in order to do so, it will be necessary to improve its facilities. In proportion to an increase in the number of imported vaccines, it will be necessary to consider the importance of quality control in the future.

3.4. Problems involved in Medical Care Services

The medical care system in Sri Lanka is pyramid-shaped referral system, which starts from the subdivisional centers up to the urban hospitals. In reality, however, the facilities of the subdivisional centers are insufficient, and due to free medical care and good communication facilities, patients tend to crowd the high-ranking hospitals such as provincial hospitals and base hospitals beyond the hospitals' management capacity. Moreover, if we compare the number of beds of each hospital to that of other countries, we see that there is a marked shortage of physicians, nurses, medical and

laboratory technologists. There is also a notable shortage of, as well as obsolete, hospital facilities, medical and examination equipment at the above centers. This can lower the physicians' will to work, and eventually lead to technical, as well as moral, ruin. As far as diseases are concerned, there are occurrences of uncomplicated diarrheal diseases and fever, bronchitis, urinary infections, eczema, dermal infections, otitis media, pharyngitis, as well as rhinitis. Furthermore, diseases of the central nerve and serious heart diseases should be treated at the provincial and training hospitals, and the hospitals should be equipped with ICU, CCU, as well as emergency facilities. It will also be necessary to have a satisfactory number of hospital staff and well-equipped apparatus. Additionally, laboratory capacity should be improved so as to enable clinical studies. As the hospitals' information systems are unsatisfactory, at present it is not possible to devise a suitable plan for the future. Improvement is also needed in this respect. If these requirements are fulfilled, Sri Lanka's medical services will be improved, and accordingly will heighten its standard of health.

3.5. Problems involved in Subdivisional Medical Centers

In the medical centers which are the smallest of all public health centers, and besides, smaller than health units and rural hospitals, an obvious shortage of personnel and facilities may be seen. Because of this shortage of personnel, the hospitals' facilities barely get the chance to demonstrate their functions. Even at the health units where medical officers of health are stationing, microscopes and simple centrifuges are needed.

3.6. Measures against Parasites

As malaria and filariasis are considered cases which need specific countermeasures, blood tests, mosquito vector control, and treatment activities are carried out at present. Although a complete system has been set up to fight against malaria, there is a shortage of personnel and equipment. For instance, a malaria center in a certain region, employing 11 technicians, would have to be in charge of 100,000 cases a year. Most of the existing microscopes are of the monocular type, made 20-30 years ago, and needed to replace. Although the control of

mosquito vectors is carried out every 1-3 months, it would be preferable to carry it out once a month. And in order to conduct this operation, vehicles and automatic spraying machines are needed. Moreover, it would be best to consider providing workers with protective wear for safety reasons. It will be necessary to carry out epidemiological studies on malaria and filariasis on a long-term basis.

Few measures have been taken against intestinal protozoa and parasitic infections. It is urgently necessary to conduct a country-wide study in order to grasp the actual state of infectious diseases as well as to execute countermeasures. Such countermeasures are also necessary against visceral parasites, which are the leading causes of toxoplasmosis and amebic liver abscesses.

3.7. Primary Health Care (PHC)

As already stated, the government of Sri Lanka has a 10-year plan to complete the Primary Health Care Complex project. Yet this project is barely supported by a budget necessary for its facilities and the employment of personnel. The maintenance of the Gramodaya Health Center is the most serious problem, needing 3,111 establishments, but it is uncertain whether it can guarantee such a budget. Moreover, in order for the medical centers to completely fulfill their functions, they must be equipped with a large number of equipment, such as bicycles, midwife kits, and simple water test kits for midwives. As far as personnel are concerned, there is a shortage of physicians, PHI, as well as dental nurses.

The participation of the residents is a prior condition to the success of the PHC project, but their customs and adjustments to the system can cause certain problems. Thus it will be necessary to emphasize the importance of health education received by the personnel.

3.8. Indispensable Medical Supplies

The country relies mostly on imported products or foreign aid for its medical supplies. It relies its minimum medical supplies, such as essential drugs, on foreign aid, and is now carrying forward a plan so as to be able to provide itself with such indispensable medical supplies in the future.

The country also depends on UNICEF for its supplies of malathion, an indispensable drug against malaria. Facts concerning vaccines have already been stated.

3.9. Information System

Although the notification system concerning infectious diseases has been established, there is almost no record of the total number of patients who visited hospitals. Unless this is corrected, an appropriate management of hospitals cannot be expected.

3.10. Others

The improvement in nutrition is a serious matter in Sri Lanka, and although it relies on special food supplied by industrialized nations, this may not bring about a radical solution to the problem. Infectious diseases are also a major obstacle to the improvement in environmental hygiene, and although the government may be struggling to make their activities a success by receiving foreign assistance, the country is still far from reaching their aim towards improvement.

4. Assistance by Japan: Its Course and Proposals

According to the study carried out by the Japanese survey team on the present state of infectious diseases in Sri Lanka, and the results of discussions held with officials of the Ministry of Health, Japan proposes to assist by the following means:

4.1. As previously stated, although it is necessary to solve the various problems in order to improve health conditions in Sri Lanka, there are very few which can actually be solved by the Sri Lanka administration alone.

4.1.1. The training of medical personnel, especially that of physicians, is a prerequisite to the success of the project. An increase in the number of institutes for the training of nurses is also necessary (foreign assistance may be needed).

4.1.2. It will also be necessary to reemphasize the importance of a medical referral system, and to consider providing medical care appropriate to the size of each hospital. And hence, an increase in the number of personnel and equipment will also be needed in accordance with its size. Other points in need of improvement may arise on examining the actual state of each hospital. It will be necessary to improve the method of counting the number of patients visiting the hospitals, and personnel in charge at the hospitals will have to make an effort to grasp the actual situation at the hospitals. And in order to observe such an improvement, there must be an increase in the number of personnel in charge at each hospital.

4.1.3. The budget for medically-related matters will tend to go to the medical centers, and especially to the central hospitals. It would be preferable to consider the subdivisional centers for the execution of PHC. It would be well to examine the minimum amount of equipment needed, machines, such as refrigerators, as well as supplies of consumable products and reagents.

4.1.4. In order to grasp the actual state of the diseases, it will be necessary to station epidemiological experts at every 2 or 3 regions, and to have them make an analysis of the regional level as medical information. Needless to say, this information will be notified to the Central Office. In this way, it will be possible to grasp the actual state, and will be useful when planning suitable countermeasures.

4.2. As far as the course of Japanese assistance is concerned, in general it will be necessary to spend much more time collecting information and to consider the capability of personnel concerned in the provinces, as well as forecast of the future. The survey team proposes to assist in the following ways:

4.2.1. Emphasize the importance of institutes dealing with examination studies and researches

4.2.1.1. The modernization of the Medical Research Institute (MRI)

4.2.1.2. The development of vaccines and improvement in quality control

4.2.1.3. Emphasis on regional hospitals' examination capacity

As previously stated, one of the flaws involved in Sri Lanka's medical and public health activities is the poor quality in the services provided by examination laboratories. Epidemiological studies of diseases, accurate clinical diagnoses, an understanding of the country's health problems, and appropriate countermeasures cannot be made possible with the present state of the laboratories. Although the MRI is the only research institute affiliated with the Ministry of Health and is the referral institute in the field of hospital examinations, as its facilities are obsolete and in want of equipment, it cannot solve the various medical and public health problems.

As a central institute, whose purpose is to support medical and public health activities, the MRI needs to adopt new technology and to carry out researches indispensable to the improvement of the country's health conditions.

Although at present vaccines are supplied by UNICEF, as this is a limited assistance (until 1987), Sri Lanka must find new countermeasures for the future. Although the officer in charge at the MRI is considering importing concentrated vaccines and diluting them, it is difficult to produce safe products with the present facilities. Also vaccines against rabies, presently being produced, should be transformed into tissue culture. In order to do this, it is necessary to improve facilities and equipment. Moreover, quality control and the basic distributional price of live vaccines must especially be examined.

There is no institute equivalent to a regional health research center in Sri Lanka. The hospitals are unreliable as far as examinations are concerned, and cannot carry out microbiological and epidemiological examinations satisfactorily. In order to improve medical and public health activities, it is necessary to emphasize the importance of examinations in the provinces.

In order for the MRI to fulfill its function as an examination and reference center, it must reduce its routine examination activities.

Examination departments of 2 or 3 general hospitals need to be reinforced, and the institute must equip itself so as to enable itself to carry out intermediary reference activities for other hospitals. And in such a way, it will be able to reach its goal. Such institutes will supply the MRI with the necessary documents and eventually become regional centers.

4.2.2. Assistance to the hospitals

Facilities at the regional hospitals are inadequate and obsolete, and are the causes of the crowding of patients at the upper-ranked hospitals, such as those in Colombo. It would be well to make an effort to gradually improve the diagnosis capacity at the training and regional hospitals. It would also be well to go as far as collaborating in the clinical researches of the hospitals, including those which have already been guaranteed assistance.

4.2.3. Assistance in the reinforcement of health manpower

In view of the shortage of physicians and paramedical personnel, Japan will need to assist in such a way so that the health manpower may be trained in well-facilitated training hospitals where the competent trainers are centralized.

4.2.4. Assistance in the measures against specific diseases

Although specific measures against diseases, such as malaria, filariasis, leprosy, tuberculosis, and sexual diseases, are important factors to the improvement of the country's health conditions, there are few budgetary allocations for them. Sexual diseases is an example of this, whereby good results may be obtained if appropriate equipment (inexpensive) were provided.

4.2.5. Assistance in the self-provision of indispensable medical products

Although Sri Lanka depends on foreign aid or imports for its essential drugs, it must be necessary to provide itself with at least the minimum medical products. The Ministry of Health is examining this matter, and is hoping to receive support from Japan in order to realize this matter.

4.2.6. Assistance in equipment necessary for the Primary Health Care Complex

As far as subdivisional health centers are concerned, they will need to be provided with equipment necessary for diagnoses and refrigerators necessary for EPI. Furthermore, vehicles, such as bicycles, are indispensable to the mobility of public health activities of the subdivisional centers.

4.3. The survey team's opinions on giving health and medical assistance to Developing nations

As far as the assistance to developing countries is concerned, the country must not only depend on the supplies of equipment, but must take this opportunity to stand on its own two feet. Although facilities and equipment may be important needs, it is also eagerly desired to reinforce personnel training and to find the means to keep in touch with such personnel after projects have completed. If the country were to abide by such principles, Japan would stand by the country on a long-term basis and would willingly give its assistance. Furthermore, in order to make the most of the results obtained by international assistance on a long-term basis, it would be well to consider correlating the various international assistance and collaborative studies carried out by the ministries concerned to the projects conducted by JICA so that the country's budgetary allocations can be used effectively.

Recommendations

Based on their observations and their discussions with many health personnel of the Ministry of Health, Sri Lanka, the team recommends the following cooperations between the Ministry of Health, Sri Lanka and the Government of Japan through Japan International Cooperation Agency (JICA)

1.1. Strengthening Laboratory Services and Research Activities

1.1.1 Modernization of the facilities of the Medical Research Institute (MRI)

1.1.2 Strengthening research capabilities of MRI

First of all the training to develop qualified manpower and simultaneous supply of necessary equipment.

1.1.3 Strengthening the capability to develop the vaccines and to control them. Facilities should also be improved.

1.1.4 A few laboratories in the hospitals at provincial level should be upgraded so that they can serve as the reference laboratory for other regional laboratories and simultaneously perform quick services not only for the management of patients but also for the epidemiological surveillance at the provincial level.

1.2. Assignment of a regional epidemiologist in every 2 - 3 regions would be required in order to monitor the changing pattern of diseases and subsequently to adjust control strategies at regional level through co-ordination with regional and central health authorities.

1.3. Supply of various medical instruments to hospitals should be implemented, particularly to those of regional hospitals and development of training programmes to raise qualified health manpower in such hospitals.

1.4. Assistance to establish the Primary Health Complex

1.5. Assistance to Anti-Malaria campaign, Anti-Tuberculosis and Anti-VD campaign.

1.6. Assistance to establish self-reliance of essential drug production and infusion fluid.

INCEPTION REPORT OF OBSERVATION TEAM
ON INFECTIOUS DISEASES IN SRI LANKA

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| | |
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Figure 2 AGE DISTRIBUTION OF TUBERCULOSIS IN SRI LANKA (1983)

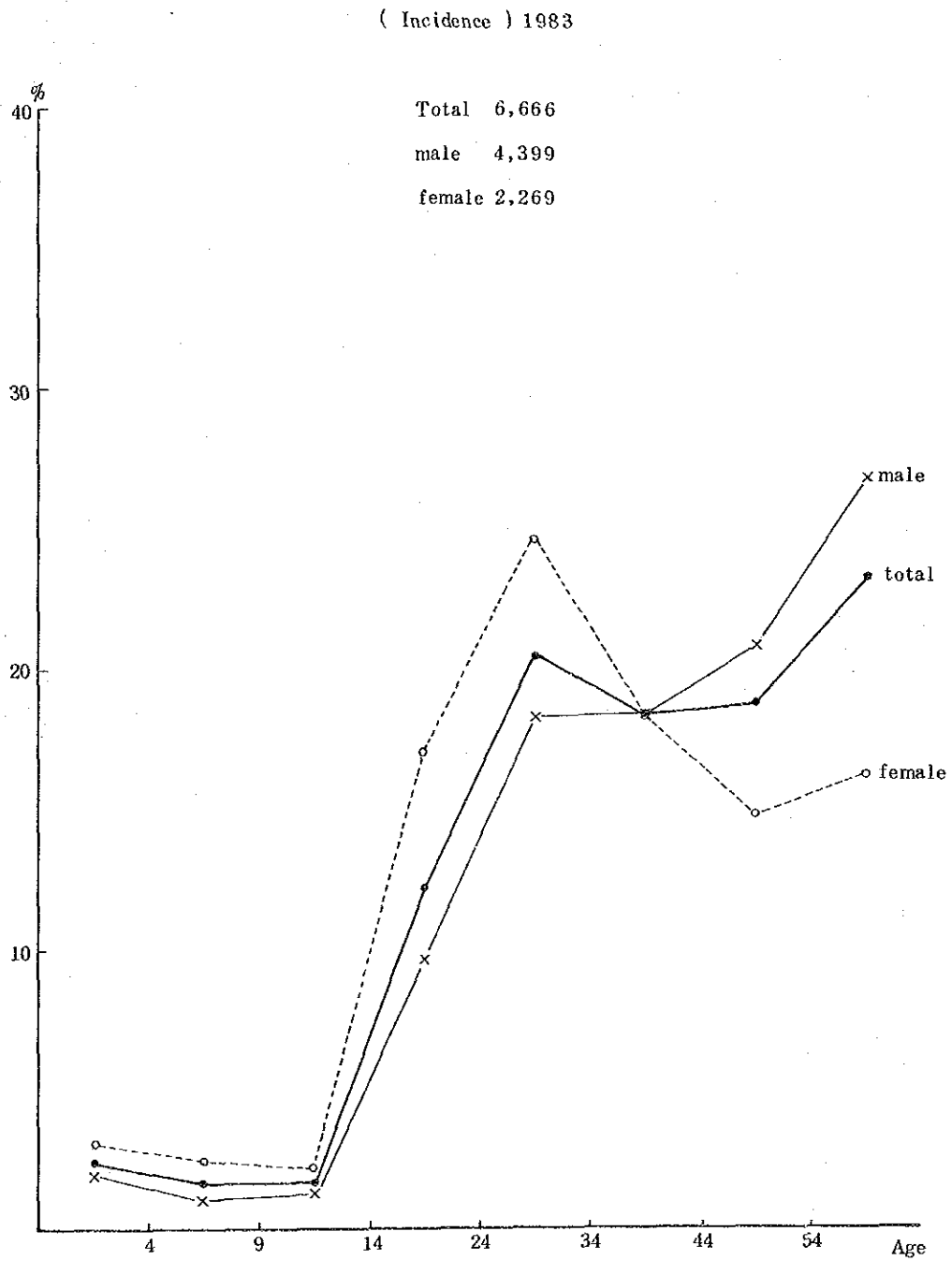


Table 1 INFANT MORTALITY IN THE SELECTED ASIAN COUNTRIES

| | 1970 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|-------------|----------------------|------------------------|------|------|------|------|------|------|------|------|
| Bangladesh | | 1329 | | 1103 | 1142 | | | 974 | 1095 | 1194 |
| Indonesia | 137 | (mean of 1961~1971) | | 110 | | | | 90 | | |
| Japan | 131 | 108 | 100 | 93 | 89 | 84 | 79 | 75 | 71 | 66 |
| Philippines | | 587 | 533 | 569 | 568 | 531 | 502 | | | |
| Sri Lanka | 475 (140 in 1945) | | 451 | 437 | 424 | 371 | 377 | 344 | | |
| Thailand | | | | 255 | | | 142 | 133 | 125 | 124 |

Table 2 HOSPITAL MORBIDITY AND MORTALITY IN SELECTED YEARS 1965-1983

| Disease Groups (ICD Ninth Revision Grouping) | Cases Discharged from Government Hospitals per 100,000 Population | | | | Deaths in Government Hospitals per 100,000 Population | | | | | |
|--|--|----------|----------|----------|--|-------|-------|-------|-------|-------|
| | 1965 | 1970 | 1975 | 1980 | 1983 | 1965 | 1970 | 1975 | 1980 | 1983 |
| 1. Infectious and Parasitic Diseases | 1,731.8 | 3,206.1 | 2,703.0 | 2,065.4 | 2,521.3 | 32.5 | 43.3 | 42.1 | 23.1 | 24.6 |
| 2. Neoplasms | 122.3 | 137.4 | 155.7 | 129.6 | 134.6 | 8.3 | 10.3 | 8.8 | 6.4 | 7.7 |
| 3. Endocrine, Nutritional and Metabolic Disorders and Immunity Disorders. | 837.2 | 338.9 | 325.2 | 234.1 | 216.9 | 8.6 | 7.1 | 15.9 | 3.5 | 4.1 |
| 4. Diseases of Blood and Blood Forming Organs. | 611.7 | 533.9 | 450.9 | 359.0 | 314.6 | 8.3 | 6.7 | 10.5 | 3.5 | 2.9 |
| 5. Mental Disorders. | 133.2 | 176.8 | 174.3 | 226.9 | 193.6 | 1.0 | 0.6 | 1.5 | 2.2 | 0.5 |
| 6. Diseases of the Nervous System and Sense Organs. | 405.6 | 397.2 | 350.3 | 398.0 | 416.7 | 10.8 | 6.6 | 7.1 | 6.6 | 7.2 |
| 7. Diseases of the Circulatory System | 520.7 | 528.7 | 574.9 | 617.4 | 647.2 | 32.0 | 35.4 | 42.1 | 33.7 | 37.8 |
| 8. Diseases of the Respiratory System | 2,699.9 | 3,053.7 | 2,341.2 | 2,342.6 | 2,339.1 | 29.7 | 30.3 | 30.5 | 19.1 | 20.2 |
| 9. Diseases of the Digestive System | 1,486.0 | 883.0 | 899.7 | 692.0 | 701.2 | 27.0 | 11.6 | 12.5 | 8.4 | 9.0 |
| 10. Diseases of the Genito-Urinary System | 468.3 | 598.3 | 577.1 | 662.3 | 674.7 | 5.1 | 5.1 | 4.8 | 3.0 | 3.6 |
| 11. Complications of Pregnancy, Childbirth and Puerperium. | 2,844.6 | 2,739.7 | 2,998.1 | 3,427.6 | 3,136.7 | 6.6 | 3.2 | 2.4 | 1.5 | 1.4 |
| 12. Diseases of the Skin and Subcutaneous tissues. | 490.8 | 651.0 | 711.4 | 596.8 | 586.1 | 0.5 | 0.3 | 1.2 | 0.5 | 0.2 |
| 13. Diseases of the Musculoskeletal and connective tissues. | 443.9 | 338.0 | 350.4 | 414.7 | 467.3 | 0.4 | 0.3 | 0.2 | 0.2 | 0.1 |
| 14. Congenital Anomalies | 22.7 | 56.6 | 34.0 | 30.6 | 34.0 | 2.4 | 5.4 | 5.7 | 3.3 | 1.9 |
| 15. Certain conditions originating in the perinatal period. | 167.0 | 104.0 | 89.6 | 90.4 | 96.0 | 23.8 | 23.9 | 17.7 | 20.0 | 15.5 |
| 16. Symptoms, signs and ill-defined cond. | 264.7 | 711.5 | 920.4 | 1,154.9 | 1,328.9 | 11.6 | 10.5 | 15.6 | 14.1 | 12.0 |
| 17. Injury and Poisoning. | 1,523.3 | 2,055.0 | 1,750.7 | 1,743.3 | 1,662.7 | 20.6 | 17.8 | 21.2 | 27.5 | 25.1 |
| TOTAL (ALL DISEASES) | 14,773.9 | 16,509.8 | 15,406.9 | 15,185.4 | 15,471.6 | 229.1 | 218.5 | 239.8 | 176.7 | 174.1 |

Source: Office of the Medical Statistician

Table 3

COMPARISON OF MORBIDITY AND MORTALITY (PER 10⁵ POPULATION) ASSOCIATED WITH INFECTIOUS DISEASES IN FIVE ASIAN COUNTRIES

| | Bangladesh (1981) | Indonesia (1980) | | Philippines (1979) | | Sri Lanka ³⁾ (1979) | | Sri Lanka ³⁾ (1982) | | Thailand (1979) | | Thailand (1981) | |
|-----------------------------------|----------------------|-----------------------|---------|-----------------------|-------|-----------------------------------|--------|-----------------------------------|--------|--------------------|--------|--------------------|-----------------|
| | Morb. ²⁾ | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. |
| Cholera | | 19.8 | 0.70 | 2.7 | 0.9 | 0.1 | 0.01 | b)1.8 | b)0.1 | 3.2 | 0.1 | 0.08 | 0.0 |
| Acute Diarrhea | 4,170 | 1,215 | | 466 | 35.9 | b)1,184 | b)8.9 | b)1186 | b)13.1 | 384 | a)12.5 | 513 | a)7.5 |
| | | | | | | | | | | b)1.5 | | | b)0.7 |
| Dysentery | | | | 60.7 | 3.0 | b)73.5 | b)0.4 | b)68.0 | b)1.0 | 70.7 | b)0.09 | 91.8 | b)0.04 |
| Amoebiasis | | | | | | | | b)138 | b)0.4 | | | | |
| Food Poisoning | | | | 1.1 | 0.4 | | | b)15.3 | b)0.2 | 27.6 | b)0.04 | 45.8 | b)0.03 |
| Enteric Fever | | 10.9 | 0.37 | 7.6 | 1.4 | b)51.1 | b)0.64 | b)41.3 | b)0.2 | 22.0 | a)0.6 | 23.9 | a)0.4 |
| | | | | | | | | | | b)0.1 | | | b)0.06 |
| Hepatitis | | 4.5 | 0.18 | 19.0 | 1.6 | b)43.3 | b)0.34 | b)46.2 | b)0.5 | 27.3 | b)0.23 | 19.9 | b)0.14 |
| Polioomyelitis | 40 | 3.5 - 8 (1976 - 7) | (2.1)* | 2.3 | 0.8 | b)0.98 | b)0.03 | b)0.74 | b)0.04 | 2.3 | a)0.2 | 0.5 | a)0.1 |
| | | | | | | | | | | b)0.1 | | | b)0.01 |
| Diphtheria | | (10.0)* | | 2.2 | 1.2 | a)0.7 | b)0.23 | b)0.15 | b)0.02 | 4.4 | a)1.3 | 1.7 | a)0.7 |
| Pertussis | | (3.1)* | | 45.6 | 0.3 | a)5.5 | b)0.06 | b)2.0 | b)0.01 | 11.1 | a)0.1 | 6.2 | a)0.0 |
| Measles | 320 | (3.2)* | | 62.8 | 12.0 | b)42.3 | b)0.5 | b)874 | b)0.1 | 28.6 | b)0.04 | 51.2 | b)0.04 |
| Influenza | | 1,864 | 0.8 | 406 | 3.9 | | | b)4172 | b)0.05 | 70.0 | a)1.4 | 116 | a)1.1 |
| | | | | | | | | | | b)0.0 | | | b)0.01 |
| Pneumonia, Bronchitis | 3,110 | | 148 | 272 (Pneumonia) | 105 | | | b)859 | b)15.4 | a)10.1 | 8980 | | a)9.0 |
| Other Respiratory Infection | | | | | | | | b)252 | b)0.26 | a)27.6 | | | a)3.5 (1982) |
| Tuberculosis | 160 | 604 | 62.6 | 234 | 60.6 | b)42.5 | b)4.3 | b)747 | b)4.1 | 28.8 | a)15.1 | 30.4 | a)11.9 |
| | | | | | | c)9.2 | c)9.2 | c)482 | | | | | |
| Leprosy | 20 | 5.1 | | 1.5 | 0.3 | b)1.8 | b)0.11 | b)1.9 | b)0.09 | 0.74 | | 1.24 | |
| Tetanus | 60 | | 48.7 | 6.2 | 2.6 | a)7.4 | a)1.4 | b)4.0 | b)0.9 | 4.3 | a)1.9 | 3.9 | a)1.1 (;982) |
| | | | | | | (Non-neonatal) | | | | | | | |
| Rabies | | 0.05 | 0.05 | 0.6 | 0.6 | | c)1.8 | c)0.9 | | a)0.7 | | | a)0.7 |
| | | | | | | | | | | b)0.5 | | | b)0.4 |
| Malaria | 440 | 276 | 4.1 | 68.2 | 2.5 | c)330 | b)0.98 | b)290 | b)0.21 | 164 | a)8.2 | 302 | a)8.6 |
| | | | | | | | c)316 | c)316 | | b)1.2 | | | b)1.0 |
| Dengue Fever | | 3.6 | 0.17 | 0.7 | 0.09 | | | b)0.17 | b)0.0 | 24.9 | b)0.28 | 54.1 | b)0.42 |
| Encephalitis | | 0.6 | (46.6)* | 0.4 | 0.02 | | | b)0.28 | b)0.03 | 4.5 | a)3.0 | 3.3 | a)2.0 |
| Filariasis | | | | | | | | b)12.1 | b)0.01 | b)10.6 | b)0.04 | | b)0.54 |

1) Morb. = Morbidity per 100,000 population
Mort. = Mortality per 100,000 population

Sri Lanka

(a) According to the data based on the Joint Survey by UID and University of Colombo and Ministry of Health, Sri Lanka.

(b) Data from hospital Statistics

(c) Data based on Special Campaign

Thailand

(a) Public Health Statistics

(b) Annual Summary Surveillance Report 1981

2) Intestinal Parasitic Diseases (2,710) and Skin Infection (2,250) are reading Infections in Bangladesh

3) Mortality of Malaria (1960 - 1977)

b) 0.6 - 3.6, c) 0.1 less than of

Table 4 BASIC INDICATORS OF SELECTED COUNTRIES

| Country | Population Million 1981 | Area (thousands of square kilometers) | GNP per Capita | | Average annual rate of inflation(percent) | | Adult Literacy percent 1980 | Life Expectancy at birth (years) 1981 |
|--------------------|-------------------------------|--|-----------------|---|--|---------|--------------------------------------|---|
| | | | Dollars 1981 | Average annual growth (percent) 1960-81 | 1960-70 | 1970-81 | | |
| Afghanistan ... | 16.3 | 648 | ... | ... | 11.9 | 5.0 | 20 | 37 |
| Bhutan ... | 1.3 | 47 | 80 | 0.1 | ... | ... | ... | ... |
| Bangladesh ... | 90.7 | 114 | 140 | 0.3 | 3.7 | 15.7 | 26 | 55 |
| Nepal ... | 15.0 | 141 | 150 | 0.0 | 7.7 | 9.3 | 19 | 45 |
| India ... | 690.2 | 3,288 | 260 | 1.4 | 7.1 | 8.1 | 36 | 52 |
| Pakistan ... | 84.5 | 804 | 350 | 2.8 | 3.3 | 13.1 | 24 | 50 |
| Sri Lanka ... | 15.0 | 66 | 300 | 2.5 | 1.8 | 13.1 | 85 | 69 |
| Burma ... | 34.1 | 677 | 190 | 1.4 | 2.7 | 10.7 | 66 | 54 |
| Thailand ... | 48.0 | 514 | 770 | 4.6 | 1.8 | 10.0 | 86 | 63 |
| Malaysia ... | 14.2 | 330 | 1,840 | 4.3 | 0.3 | 7.4 | 60 | 65 |
| Philippines ... | 49.6 | 300 | 790 | 2.8 | 5.8 | 13.1 | 75 | 63 |
| Indonesia ... | 149.5 | 1,919 | 530 | 4.1 | ... | 20.5 | 62 | 54 |
| Iran ... | 40.1 | 1,648 | ... | ... | 0.5 | 20.1 | 50 | 58 |
| Saudi Arabia ... | 9.3 | 2,150 | 12,600 | 7.8 | ... | 24.3 | 25 | 25 |
| Egypt ... | 43.3 | 1,001 | 650 | 3.5 | 2.6 | 11.1 | 44 | 57 |
| Turkey ... | 45.5 | 781 | 1,640 | 3.5 | 5.6 | 32.7 | 60 | 62 |
| Brazil ... | 120.5 | 8,512 | 2,220 | 5.1 | 46.1 | 42.1 | 76 | 64 |
| United states ... | 229.8 | 9,363 | 22,820 | 2.3 | 2.9 | 7.2 | 99 | 73 |
| Japan ... | 117.6 | 372 | 10,080 | 6.3 | 5.1 | 7.4 | 99 | 77 |
| China ... | 991.3 | 9,561 | 500 | 5.0 | ... | ... | 69 | 67 |
| United Kingdom ... | 56.0 | 245 | 9,110 | 2.1 | 4.1 | 14.4 | 99 | 74 |
| Germany F.R. ... | 61.7 | 249 | 13,450 | 3.2 | 3.2 | 5.0 | 99 | 73 |
| U.S.S.R. ... | 268.0 | 22,402 | ... | ... | ... | ... | 100 | 72 |
| Poland ... | 35.9 | 313 | ... | ... | ... | ... | 98 | 73 |

Source : World Development Report, 1983

Table 5 CHANGING PATTERN OF LEADING INFECTIOUS DISEASES AND MALNUTRITION

| | | 1970 | 1973 | 1976 | 1979 | 1982 | 1983 |
|--------------------------------|-------|--------|------|------|-------------------|-------------------|------|
| Acute Diarrhea ¹⁾ | Morb | 1488.2 | 1536 | 1596 | 1184 | 1186 | |
| | Mort | 18.4 | 19.5 | 27.5 | 8.9 | 13.1 | |
| | Mort* | 39.3 | 48.8 | 54.4 | 31.1 | | |
| Enteric Fever | Morb | 35.3 | 43.5 | 79.2 | 51.1 | 41.3 | |
| | Mort | 0.5 | 0.7 | 1.0 | 0.6 | 0.2 | |
| Bacillary Dysentery | Morb | 30.0 | 27.1 | 106 | 73.5 | 68.4 | |
| | Mort | 0.4 | 0.6 | 2.9 | 0.4 | 1.0 | |
| Hepatitis | Morb | 62 | 109 | 132 | 43.3 | 46.2 | |
| | Mort | | 0.7 | | 0.3 | 0.5 | |
| Tuberculosis | Morb | 46.0 | 45.6 | 49.7 | 42.5 | 48.2 | |
| | Mort | 12.5 | 11.1 | 11.6 | 9.2 | | |
| Malaria ³⁾ | Morb | 3794 | 1711 | 2150 | 330 | 316 | |
| | Mort | 0.1 | 0.02 | 0.01 | 0.98 [§] | 0.21 [§] | |
| Diphtheria | Morb | 7.9 | 3.7 | 1.1 | 0.7 | 0.13 | 0.16 |
| | Mort | 0.9 | 0.5 | 0.3 | 0.2 | 0.02 | |
| Neonatal Tetanus ⁴⁾ | Morb | 230 | 262 | 169 | 107 | 40.5 | 16.3 |
| Pertussis | Morb | 13.4 | 7.3 | 8.3 | 5.5 | 1.8 | 1.6 |
| | | | | | | | |
| Anemia | Morb | | 529 | 473 | 380 | 341 | |
| | Mort | | 8.0 | 10.9 | 4.4 | 2.8 | |
| Nutritional Deficiency | Morb | | 164 | 224 | 181 | 129 | |
| | Mort | | 3.3 | 7.4 | 2.4 | 1.3 | |

1) Mark * : Mortality including patients outside of hospitals.

2) Acute Diarrhea, Enteric Fever, Dysentery are in 1971.

3) § = Mortality in hospitals other figures were obtained from Malaria Campaign National Centre.

4) In addition to the above diseases morbidity and mortality caused by Lower Respiratory infections (Pneumonia, bronchitis) were 859 and 15.4 respectively. In 1982, the morbidity and mortality of Amoebiasis are 138 and 0.4.

Table 6 OCCURRENCE OF LEADING INFECTIOUS DISEASES¹⁾

| | Bangladesh ²⁾ (1981) | | Indonesia (1980) | | Philippines (1979) | | Sri Lanka ³⁾ (1982) | | Thailand (1979) | | Thailand (1981) | | |
|------------------------------|------------------------------------|--------------------|----------------------|--------------------|-----------------------|--------------------|-----------------------------------|--------------------|--------------------|-------------------|--------------------|-------------------|-------------------|
| | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort | |
| Cholera | ↓ | 19.8 | 0.70 | 0.9 | 0.1 | 0.01 | b) 1.8 | b) 0.1 | 3.2 | 0.1 | 0.08 | 0.0 | |
| Acute Diarrhea | 4,170 | 1,215 | (3.1) ^{**} | 466 | 35.9 | b) 1,184 | b) 2.9 | b) 1,186 | b) 13.1 | a) 125 b) 1.5 | 513 | a) 7.5 b) 0.7 | |
| Dysentery | ↓ | | | 607 | 3.0 | b) 735 | b) 0.4 | b) 68.0 | b) 1.0 | b) 0.09 | 91.8 | b) 0.04 | |
| Amoebiasis | | | | | | b) 138 | b) 0.4 | b) 138 | b) 0.4 | | | | |
| Food Poisoning | | | | 1.1 | 0.4 | | b) 15.3 | b) 0.2 | 27.6 | b) 0.04 | 45.8 | b) 0.03 | |
| Enteric Fever | | 10.9 | 0.37 | 7.6 | 1.4 | b) 51.1 | b) 0.84 | b) 41.3 | b) 0.2 | a) 0.6 b) 0.1 | 23.9 | a) 0.4 b) 0.06 | |
| Hepatitis | | 4.5 | 0.18 | 19.0 | 1.6 | b) 43.3 | b) 0.34 | b) 46.2 | b) 0.5 | 27.3 | 19.9 | b) 0.14 | |
| Polioomyelitis | 40 | 3.5-8 (1976-77) | (2.1) ^{**} | 2.3 | 0.8 | b) 0.98 | b) 0.03 | b) 0.74 | b) 0.04 | 2.3 | a) 0.2 b) 0.1 | 0.5 | a) 0.1 b) 0.01 |
| Diphtheria | | | (10.0) ^{**} | 2.2 | 1.2 | a) 0.7 | b) 0.23 | b) 0.15 | b) 0.02 | 4.4 | a) 1.3 | 1.7 | a) 0.7 |
| Pertussis | | | (3.1) ^{**} | 45.6 | 0.3 | a) 5.5 | b) 0.06 | b) 2.0 | b) 0.01 | 11.1 | a) 0.1 | 6.2 | a) 0.0 |
| Measles | 320 | | (3.2) ^{**} | 62.8 | 12.0 | b) 42.3 | b) 0.5 | b) 87.4 | b) 0.1 | 28.6 | b) 0.04 | 51.2 | b) 0.04 |
| Influenza | ↓ | 1,864 | 0.8 | 405 | 3.9 | | b) 47.2 | b) 0.05 | 70.0 | a) 1.4 b) 0.0 | 116 | a) 1.1 b) 0.01 | |
| Pneumonia, Bronchitis | 3,110 | ↓ | 1.48 | 272 (Pneumonia) | 105 | | b) 859 | b) 15.4 | a) 10.1 | 8,980 | a) 9.0 | a) 3.5 (1982) | |
| Other Respiratory Infections | ↓ | | | | | | b) 252 | b) 0.26 | a) 27.6 | | | | |
| Tuberculosis | 160 (Mort 70) | 604 | 62.6 | 234 | 60.6 | b) 42.5 c) 48.2 | b) 4.3 c) 5.2 | b) 74.7 c) 48.2 | b) 4.1 | 28.8 | a) 15.1 | 30.4 | a) 11.9 |
| Leprosy | 20 | 5.1 | | 1.5 | 0.3 | b) 1.8 | b) 0.11 | b) 1.9 | b) 0.09 | 0.74 | | 1.24 | |
| Tetanus | 60 | | 48.7 | 6.2 | 2.6 | a) 7.4 | a) 1.4 (non-neonatal) | b) 4.0 | b) 0.9 | 4.3 | a) 1.9 | 3.9 | a) 1.1 (1982) |
| Rabies | | 0.05 | 0.05 | 0.6 | 0.6 | | c) 1.8 | c) 0.9 | | a) 0.7 b) 0.5 | | a) 0.7 b) 0.4 | |
| Malaria | 440 | 276 | 4.1 | 68.2 | 2.5 | c) 330 | b) 0.98 | b) 290 c) 316 | b) 0.21 | 164 | a) 5.2 b) 1.2 | 302 | a) 8.6 b) 1.0 |
| Dengue Fever | | 3.6 | 0.17 | 0.7 | 0.09 | | b) 0.17 | b) 0.0 | 24.9 | b) 0.28 | 54.1 | b) 0.42 | |
| Encephalitis | | 0.6 | (45.6) ^{**} | 0.4 | 0.02 | | b) 0.28 | b) 0.03 | 4.5 | a) 3.0 b) 1.07 | 3.3 | a) 2.9 b) 0.54 | |
| Filaria | | | | | | b) 12.1 | b) 0.01 | b) 10.6 | b) 0.04 | | | | |

(1) Morb: Morbidity per 100,000 Population, Mort: Mortality per 100,000 Population, ()^{**} Case fatality based on hospital records, (a)(b)(c): Contradictory figures according to the sources of information, Sri Lanka: (a) Cooperative survey by Sri Lanka and USAID, (b) Hospital Statistics, (c) Vertical programmes, Thailand: (a) Public Health Statistics, (b) Annual Summary Surveillance Report (1981)

(2) There are high morbidity rates caused by the intestinal parasites and by skin infections in Bangladesh (2,700 and 2,250 respectively).

(3) There is an appreciable difference in (b) 0.6-3.6 and (c) less than 0.1 of the Malaria Mortality.

Table 7 MALARIA MORBIDITY AND MORTALITY IN SRI LANKA
FROM 1910 TO 1983

| Year | Total population | No. of Blood Smears xam. | No. of positive Cases | No. of Deaths |
|---------|------------------|--------------------------|-----------------------|---------------|
| 1910/11 | | | 515,590 | ? |
| 1911/12 | | | 869,369 | ? |
| 1912/13 | | | 787,987 | ? |
| 1914 | | | 772,364 | ? |
| 1915 | | | 485,082 | ? |
| 1916 | | | 682,919 | ? |
| 1917 | | | 348,728 | ? |
| 1918 | | | 367,854 | ? |
| 1919 | | | 616,172 | ? |
| 1920 | | | 505,370 | ? |
| 1921 | | | 916,152 | ? |
| 1922 | | | 986,187 | ? |
| 1923 | | | 1,227,747 | ? |
| 1924 | | | 950,807 | ? |
| 1925 | | | 808,638 | ? |
| 1926 | | | 1,086,272 | ? |
| 1927 | | | 891,549 | ? |
| 1928 | | | 1,583,645 | ? |
| 1929 | | | 1,654,944 | ? |
| 1930 | | | 1,759,648 | ? |
| 1931 | | | 1,487,521 | 1,661 |
| 1932 | | | 1,538,890 | 1,683 |
| 1933 | | | 1,116,543 | 1,409 |
| 1934 | | | 2,333,945 | 2,332 |
| 1935 | | | 5,459,539 | 47,326 |
| 1936 | | | 2,947,539 | 7,613 |
| 1937 | | | 2,308,976 | 4,408 |
| 1938 | | | 2,053,079 | 4,778 |
| 1939 | | | 3,210,795 | 10,039 |

(cont'd...)

| Year | Total population | No. of Blood Smears Exam. | No. of positive Cases | No. of Deaths |
|------|------------------|---------------------------|-----------------------|---------------|
| 1940 | | | 3,413,618 | 9,169 |
| 1941 | | | 3,220,360 | 7,132 |
| 1942 | 6,044,000 | | 3,225,477 | 5,143 |
| 1943 | 6,161,000 | | 2,141,329 | 6,765 |
| 1944 | 6,308,000 | | 1,672,470 | 5,604 |
| 1945 | 6,516,000 | | 2,539,949 | 8,539 |
| 1946 | 6,719,000 | | 2,768,385 | 12,587 |
| 1947 | 6,903,000 | | 1,459,880 | 4,562 |
| 1948 | 7,109,000 | | 775,276 | 3,349 |
| 1949 | 7,321,000 | | 727,769 | 2,403 |
| 1950 | 7,544,000 | | 610,781 | 1,903 |
| 1951 | 7,742,000 | | 448,100 | 1,599 |
| 1952 | 7,940,000 | | 269,024 | 1,049 |
| 1953 | 8,155,000 | | 91,990 | 722 |
| 1954 | 8,385,000 | | 37,664 | 447 |
| 1955 | 8,589,000 | | 23,370 | 268 |
| 1956 | 8,929,000 | | 43,158 | 144 |
| 1957 | 9,165,000 | | 36,168 | 08 |
| 1958 | 9,360,000 | 63,866 | 1,037 | 01 |
| 1959 | 9,585,000 | 305,740 | 1,596 | - |
| 1960 | 9,611,000 | 596,933 | 422 | - |
| 1961 | 9,836,497 | 796,307 | 110 | - |
| 1962 | 10,107,000 | 1,028,622 | 31 | - |
| 1963 | 10,385,000 | 949,919 | 17 | 01 |
| 1964 | 10,940,000 | 1,213,133 | 150 | 01 |
| 1965 | 11,237,000 | 1,247,808 | 308 | 01 |
| 1966 | 11,478,000 | 1,455,259 | 499 | - |
| 1967 | 11,784,000 | 1,439,547 | 3,466 | 01 |
| 1968 | 12,108,000 | 1,681,052 | 440,644 | 64 |
| 1969 | 12,400,000 | 1,466,467 | 537,705 | 49 |

(cont'd...)

| Year | Total population | No. of Blood Smears Exam. | No. of positive Cases | No. of Deaths |
|------|------------------|---------------------------|-----------------------|---------------|
| 1970 | 12,342,000 | 1,500,414 | 468,202 | 12 |
| 1971 | 12,657,000 | 1,371,465 | 145,368 | 07 |
| 1972 | 12,994,000 | 1,545,700 | 132,604 | 04 |
| 1973 | 13,305,000 | 1,455,572 | 227,713 | 02 |
| 1974 | 13,603,000 | 1,423,000 | 315,448 | 02 |
| 1975 | 13,841,000 | 1,439,000 | 400,777 | 05 |
| 1976 | 14,164,000 | 1,408,644 | 304,487 | 02 |
| 1977 | 14,023,000 | 954,756 | 262,460 | 02 |
| 1978 | 14,302,000 | 968,327 | 69,685 | - |
| 1979 | 14,536,000 | 1,001,217 | 48,004 | - |
| 1980 | 14,650,000 | 803,692 | 47,949 | - |
| 1981 | 14,941,000 | 892,143 | 47,383 | - |
| 1982 | 15,102,451 | 1,127,605 | 38,566 | - |
| 1983 | 15,372,850 | 1,055,626 | 127,264 | - |

From Wickramidirghi,
and Annual

Med. J. 1981
Bulletin Sri Lanka, 1982.

Table 8 INFECTIOUS DISEASES AS CAUSE OF DEATHS IN BARIOUS VEGIONS

| Region | Rank ¹⁾ | Mortality of infectious diseases (a) | Mortality of all causes (b) | a/b % | Remarks |
|-------------------------|--------------------|--------------------------------------|-----------------------------|-------|--|
| Colombo | 2 | 62.2 | 765.4 | 8.13 | Curdiovascular (165); Lespiratory system (61); Injury (59) |
| Kalutara | 5 | 37.8 | 605.6 | 6.24 | Curdiovascular (83); Neurolosical (50); Perihetal (45) |
| Kandy | 4 | 77.0 ³ | 843.4 | 9.13 | Curdiovascular (110); Lespiratory system (99); Perihetal (93) |
| Nuwara Eliya | 5 | 43.6 | 707.8 | 6.16 | Lespiratory system (103); Perihetal (100); Curdiovascular (87) |
| Galle | 5 | 43.1 | 688.0 | 6.26 | Curdiovascular (75); Injury (65); Neurolosical (46) |
| Matara | 6 | 43.3 | 641.4 | 6.75 | Curdiovascular (69); Injury (54); Perihetal (50) |
| Hambantota | 2 | 44.3 | 476.6 | 9.30 | Injuru (85); Lespiratory system (37); Curdiovascular (28) |
| Jaffna | 4 | 38.3 | 531.5 | 7.21 | Curdiovascular (58); Injury (50); Lespiratory system (50) |
| Manner | 1 | 74.5 ⁴ | 470.2 | 15.8 | Injury (64); Lespiratory system (41); Curdiovascular (34) |
| Vavuniya | 5 | 20.4 | 289.3 | 7.05 | Injury (75); Perihetal(30); Lespiratory system (26) |
| Baticaloa | 2 | 154.7 ¹ | 870.1 | 17.8 | Injury (216); Lespiratory system (83); Curdiovascular (65) |
| Anparai | 1 | 100.7 ² | 516.9 | 19.5 | Injury (63); Curdiovascular (43); Lespiratory system (34) |
| Trinco malee | 2 | 56.4 | 462.8 | 12.2 | Injury (64); Curdiovascular (39); Lespiratory system (31) |
| Kurunegala | 4 | 56.6 | 592.6 | 9.55 | Injury (89); Curdiovascular (71); Neurological (69) |
| Puttalam | 4 | 64.4 | 570.2 | 11.3 | Curdiovascular (80); Injury (69); Neurological (66) |
| Anuradhapura | 2 | 74.1 ⁵ | 507.3 | 14.6 | Injury(100); Curdiovascular (45); Neurological (31) |
| Polonnaruwa | 3 | 35.3 | 388.7 | 9.08 | Injury (126); Curdiovascular (48); Lespiratory system (26) |
| Badulla | 5 | 69.2 | 856.7 | 8.08 | Perihetal (94); Curdiovascular (93); Lespiratory system (90) |
| Monaragala | 2 | 48.0 | 429.5 | 11.2 | Injury (79); Lespiratory system (38); Curdiovascular (32) |
| Ratnapura | 2 | 71.2 | 692.2 | 10.3 | Curdiovascular (78); Lespiratory (66); Injury (66) |
| Kegalle | 6 | 35.0 | 560.9 | 6.24 | Curdiovascular (65); Neurological (59); Injury (52) |
| Sri Lanka ²⁾ | 2 | 81.1 | 772.7 | 10.5 | Curdiovascular (92); Lespiratory system (67); Injury (65); Neurological (53); Perihetal (52) |

1) Rank of mortality caused by infectious diseases in individual regions. Selenity, and ill, defined condition as well as infant death are included from seventeen diseases.

2) Average in the while country 1971 - 1979.

3) The number in the circle presents rank of infectious diseases mortality among all regions.

4) Non-infectious diseases showing high mortality. The figures in parenthesis represent mortality/

Table 9 GEOGRAPHICAL PATTERNS OF INFECTIOUS DISEASES

| | | Enteritis Diarrhea | | Enteric Fever | | Bacillary dysentery | | Tuberculosis | | Malaria ^a | Tetanus | | Anemia | | Nutritional deficiency | |
|--------------|------|-----------------------|-------|------------------|-------|------------------------|-------|--------------|-------|----------------------|---------|-------|--------|-------|---------------------------|-------|
| | | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. | S.P.R. (1983) | Morb. | Mort. | Morb. | Mort. | Morb. | Mort. |
| Colombo | 1973 | 1021.3 | 30.3 | 58.4 | 0.7 | 14.1 | 0.1 | | | | 7.4 | 0.9 | 332.9 | 9.7 | 68.6 | 7.7 |
| | 1982 | 935.7 | 13.7 | 37.7 | 0.3 | 68.1 | 1.0 | 150.6 | 2.78 | 2.3 | 0.6 | 177.4 | 3.0 | 50.9 | 1.7 | |
| Kalutara | 1973 | 1142.4 | 9.0 | 24.1 | 0.1 | 26.7 | 2.0 | | | | 4.6 | 1.2 | 425.1 | 4.6 | 138.4 | 2.5 |
| | 1982 | 875.3 | 10.5 | 16.2 | 0.0 | 00.0 | 0.0 | 60.6 | 4.13 | 3.2 | 0.0 | 405.6 | 1.8 | 110.6 | 0.2 | |
| Kandy | 1973 | 593.2 | 0.5 | 41.0 | 1.3 | 44.6 | 1.2 | | | | 6.5 | 0.7 | 691.9 | 11.0 | 148.9 | 2.4 |
| | 1982 | 673.7 | 4.9 | 60.0 | 0.3 | 164.0 | 1.0 | 35.8 | 12.58 | 5.2 | 2.0 | 323.3 | 2.1 | 84.4 | 1.9 | |
| Hatale | 1973 | 707.0 | 11.3 | 33.6 | 1.4 | 33.6 | 1.2 | | | | 19.3 | 4.3 | 594.2 | 7.5 | 197.4 | 1.4 |
| | 1982 | 707.0 | 11.2 | 25.2 | 0.0 | 8.4 | 0.0 | 23.4 | 9.39 | 8.3 | 1.6 | 530.4 | 0.9 | 186.8 | 1.6 | |
| Galle | 1973 | 838.1 | 4.7 | 24.6 | 0.1 | 18.7 | 1.2 | | | | 6.7 | 1.2 | 456.3 | 10.0 | 264.8 | 5.3 |
| | 1982 | 658.8 | 4.9 | 9.7 | 0.4 | 00.0 | 0.0 | 46.3 | 7.10 | 3.5 | 1.2 | 246.7 | 3.5 | 164.8 | 2.3 | |
| Matara | 1973 | 710.0 | 10.8 | 32.0 | 0.3 | 30.8 | 1.8 | | | | 8.6 | 2.5 | 431.6 | 7.1 | 218.4 | 0.7 |
| | 1982 | 1029.6 | 7.2 | 37.5 | 0.0 | 116.7 | 5.5 | 34.6 | 8.22 | 2.9 | 0.6 | 260.1 | 5.4 | 70.4 | 0.3 | |
| Jaffna | 1973 | 525.5 | 7.9 | 23.2 | 1.2 | 37.9 | 0.0 | | | | 21.6 | 1.7 | 382.4 | 3.7 | 67.8 | 0.0 |
| | 1982 | 860.0 | 10.4 | 15.9 | 0.0 | 00.0 | 0.0 | 48.6 | 4.01 | 3.2 | 0.0 | 398.5 | 1.8 | 108.7 | 0.2 | |
| Vavuniya | 1973 | 1065.1 | 17.6 | 34.7 | 0.5 | 14.4 | 0.0 | | | | 15.5 | 4.8 | 502.4 | 3.2 | 88.2 | 1.1 |
| | 1982 | 1189.1 | 12.0 | 13.4 | 0.0 | 6.0 | 0.0 | 37.4 | 19.50 | 5.0 | 0.4 | 394.4 | 2.8 | 406.8 | 2.1 | |
| Batticaloa | 1973 | 502.6 | 7.3 | 8.2 | 0.5 | 7.9 | 0.0 | | | | 9.3 | 2.7 | 680.5 | 2.0 | 221.3 | 9.1 |
| | 1982 | 1026.8 | 2.7 | 47.1 | 0.9 | 80.9 | 0.3 | 67.6 | 11.60 | 13.9 | 4.4 | 366.1 | 3.3 | 26.7 | 1.0 | |
| Kurunegala | 1973 | 521.5 | 6.2 | 19.9 | 0.5 | 21.0 | 0.3 | | | | 7.1 | 2.8 | 523.9 | 6.5 | 113.5 | 0.3 |
| | 1982 | 928.8 | 10.9 | 29.4 | 0.2 | 23.7 | 0.2 | 29.9 | 15.77 | 5.5 | 1.1 | 436.5 | 3.8 | 100.1 | 1.4 | |
| Puttalam | 1973 | 677.4 | 11.6 | 8.6 | 0.0 | 00.0 | 0.0 | | | | 15.4 | 2.8 | 757.7 | 11.4 | 142.7 | 0.3 |
| | 1982 | 883.0 | 17.5 | 32.2 | 0.2 | 5.8 | 0.0 | 17.2 | 11.45 | 6.8 | 0.2 | 279.6 | 2.8 | 42.5 | 0.8 | |
| Anuradhapura | 1973 | 795.0 | 17.7 | 49.7 | 2.1 | 28.9 | 0.0 | | | | 12.8 | 2.1 | 534.0 | 8.1 | 127.5 | 1.8 |
| | 1982 | 594.7 | 9.2 | 22.8 | 0.1 | 4.9 | 0.0 | 30.9 | 17.75 | 4.8 | 1.0 | 519.4 | 0.5 | 301.5 | 0.5 | |
| Badulla | 1973 | 725.7 | 15.1 | 97.9 | 2.4 | 40.6 | 0.1 | | | | 8.4 | 2.2 | 592.1 | 7.6 | 241.5 | 3.0 |
| | 1982 | 597.5 | 7.9 | 103.5 | 0.5 | 97.6 | 0.2 | 23.1 | 8.70 | 4.0 | 0.6 | 546.0 | 7.9 | 141.6 | 3.4 | |
| Ratnapura | 1973 | 1312.5 | 14.8 | 44.1 | 0.9 | 65.6 | 0.3 | | | | 12.0 | 3.2 | 678.8 | 12.3 | 345.6 | 1.3 |
| | 1982 | 1089.6 | 17.1 | 53.1 | 0.2 | 18.3 | 0.5 | 47.2 | 6.40 | 2.0 | 0.7 | 353.7 | 2.1 | 194.8 | 2.1 | |
| Kegalle | 1973 | 1025.1 | 12.1 | 23.7 | 0.6 | 13.7 | 0.0 | | | | 0.5 | --- | 945.3 | 3.9 | 331.2 | 1.1 |
| | 1982 | 599.3 | 2.9 | 19.4 | 0.1 | 448.8 | 5.7 | 57.3 | 17.75 | 1.9 | 0.4 | 294.5 | 2.0 | 188.1 | 0.4 | |
| Nuwara Eliya | 1973 | 00.0 | 0.0 | --- | --- | --- | --- | | | | --- | --- | --- | --- | 00.0 | 0.0 |
| | 1982 | 638.1 | 8.8 | 84.6 | 0.4 | 27.8 | 0.2 | 7.3 | 11.99 | 1.7 | --- | 259.7 | 1.7 | 167.2 | 0.9 | |
| Amparai | 1973 | 00.0 | 0.0 | --- | --- | --- | --- | | | | --- | --- | --- | --- | 00.0 | 0.0 |
| | 1982 | 740.5 | 3.7 | 1.0 | 0.0 | 9.7 | 0.0 | 60.3 | 6.31 | 0.5 | --- | 584.3 | 0.5 | 204.4 | 0.2 | |
| Moneragala | 1973 | 00.0 | 0.0 | --- | --- | --- | --- | | | | --- | --- | --- | --- | 00/0 | 0.0 |
| | 1982 | 9;3/7 | 6.9 | 81.3 | --- | 111.8 | 0.0 | 19.2 | 9.91 | 2.7 | --- | 467.3 | 3.8 | 327.1 | 0.3 | |

* = Data in 1983 Positivity of Malaria parasites from blood smear,
Gampaha Region : 25.19%

CRLUDE BIRTH AND CRLUDE DEATH

INFANT MOTALITY IN ASIAN COUNTRIES

Appendix 1 ANNUAL RATES OF CRUDE BIRTH AND CRUDE DEATH
IN ASIAN COUNTRIES

| | | 1970 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|-------------|---|------|------|------|------|------|------|------|------|------|
| Bangladesh | B | | | | 397 | | | | | 352 |
| | D | | | | 165 | | | | | 142 |
| Indonesia | B | 438 | 402 | | | | | 362 | | 337 |
| | D | 187 | 167 | 143 | 139 | 135 | 131 | 125 | 123 | 123 |
| Japan | B | 188 | 171 | 163 | 155 | 150 | 143 | 137 | 131 | 128 |
| | D | 69 | 63 | 63 | 61 | 61 | 60 | 62 | 62 | 60 |
| Philippines | B | 262 | 283 | 301 | 303 | 305 | 308 | | | |
| | D | 67 | 64 | 69 | 69 | 70 | 65 | | | |
| Sri Lanka | B | 294 | 277 | 278 | 279 | 284 | 289 | 284 | 280 | 268 |
| | D | 75 | 85 | 78 | 74 | 66 | 65 | 62 | 60 | 61 |
| Thailand | B | 320 | 271 | 271 | 263 | 244 | 233 | 228 | 224 | 222 |
| | D | 63 | 57 | 55 | 54 | 52 | 52 | 53 | 50 | 51 |

B : Crude birth rate ; D : Crude death rate

INFANT MORTALITY IN ASIAN COUNTRIES

| | 1970 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|-------------|----------------------------|------|------|------|------|------|------|------|------|------|
| Bangladesh | | 1329 | | 1103 | 1142 | | | 974 | 1095 | 1194 |
| Indonesia | 137 (mean of 1961~1971) | | | 110 | | | | 90 | | |
| Japan | 131 | 108 | 100 | 93 | 89 | 84 | 79 | 75 | 71 | 66 |
| Philippines | | 587 | 533 | 569 | 568 | 531 | 502 | | | |
| Sri Lanka | 475 (140 in 1945) | | 451 | 437 | 424 | 371 | 377 | 344 | | |
| Thailand | | | | 255 | | | 142 | 133 | 125 | 124 |

INFECTIOUS DISEASES

Appendix 2 OCCUPANCE OF LEADING INFECTIOUS DISEASES

| | Bangladesh ²⁾ (1981) | | Indonesia (1980) | | Philippines (1979) | | Sri Lanka ³⁾ (1979) | | Thailand (1979) | | Thailand (1981) | |
|------------------------------|------------------------------------|----------------------|---------------------|--------------------|-----------------------|--------------------------|-----------------------------------|---------|--------------------|-------------------|--------------------|-------------------|
| | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort | Morb | Mort |
| Cholera | 1 | 0.70 | 198 | 0.9 | 0.1 | 0.01 | b) 1.8 | b) 0.1 | 3.2 | 0.1 | 0.08 | 0.0 |
| Acute Diarrhea | 4,170 | (3.1) ^{**} | 1,215 | 35.9 | b) 1,184 | b) 8.9 | b) 1,186 | b) 13.1 | 384 | a) 12.5 b) 1.5 | 51.3 | a) 7.5 b) 0.7 |
| Dysentery | 1 | | | | | | b) 68.0 | b) 1.0 | 70.7 | b) 0.09 | 91.8 | b) 0.04 |
| Amoebiasis | | | | | | | b) 138 | b) 0.4 | | | | |
| Food Poisoning | | | | 1.1 | | | b) 15.3 | b) 0.2 | 27.6 | b) 0.04 | 45.8 | b) 0.03 |
| Enteric Fever | 10.9 | 0.37 | | 1.4 | b) 51.1 | b) 0.64 | b) 41.3 | b) 0.2 | 22.0 | a) 0.6 b) 0.1 | 23.9 | a) 0.4 b) 0.06 |
| Hepatitis | 4.5 | 0.18 | | 1.6 | b) 43.5 | b) 0.34 | b) 46.2 | b) 0.5 | 27.3 | b) 0.23 | 19.9 | b) 0.14 |
| Polio-myelitis | 40 | (2.1) ^{**} | | 0.8 | b) 0.98 | b) 0.03 | b) 0.74 | b) 0.04 | 2.3 | a) 0.2 b) 0.1 | 0.5 | a) 0.1 b) 0.01 |
| Diphtheria | | (10.0) ^{**} | | 2.2 | a) 0.7 | b) 0.23 | b) 0.15 | b) 0.02 | 4.4 | a) 1.3 | 1.7 | a) 0.7 |
| Pertussis | | (3.1) ^{**} | | 45.6 | a) 5.5 | b) 0.06 | b) 2.0 | b) 0.01 | 11.1 | a) 0.1 | 6.2 | a) 0.0 |
| Measles | 320 | (3.2) ^{**} | | 62.8 | b) 42.3 | b) 0.5 | b) 87.4 | b) 0.1 | 28.6 | b) 0.04 | 51.2 | b) 0.04 |
| Influenza | 1,864 | 0.8 | | 406 | | | b) 47.2 | b) 0.05 | 70.0 | a) 1.4 b) 0.0 | 1.16 | a) 1.1 b) 0.01 |
| Pneumonia, Bronchitis | 3,110 | 1.48 | | 272 | | | b) 859 | b) 15.4 | | a) 10.1 | 8,980 | a) 9.0 |
| Other Respiratory Infections | 1 | | | 105 (Pneumonia) | | | b) 22 | b) 0.25 | | a) 27.6 | | a) 3.5 (1982) |
| Tuberculosis | 160 (Mort 70) | 62.6 | 604 | 60.6 | b) 42.5 c) 9.2 | b) 4.3 c) 9.2 | b) 74.7 c) 48.2 | b) 4.1 | 28.8 | a) 15.1 | 30.4 | a) 11.9 |
| Leprosy | 20 | 5.1 | | 1.5 | b) 1.8 | b) 0.11 | b) 1.9 | b) 0.09 | 0.74 | | 1.24 | |
| Tetanus | 60 | 48.7 | | 6.2 | a) 7.4 | a) 1.4 (non-neonatal) | b) 4.0 | b) 0.9 | 4.3 | a) 1.9 | 3.9 | a) 1.1 (1982) |
| Rabies | | 0.05 | | 0.6 | | c) 1.8 | | c) 0.9 | | a) 0.7 b) 0.5 | | a) 0.7 b) 0.4 |
| Malaria | 440 | 4.1 | 276 | 58.2 | c) 330 | b) 0.98 | b) 290 c) 316 | b) 0.21 | 164 | a) 1.2 b) 1.0 | 302 | a) 8.6 b) 1.0 |
| Dengue Fever | | 0.17 | | 0.7 | | b) 0.17 | b) 0.0 | b) 0.0 | 24.9 | b) 0.28 | 54.1 | b) 0.42 |
| Encephalitis | | (46.6) ^{**} | | 0.4 | | b) 0.28 | b) 0.03 | b) 0.03 | 4.5 | a) 2.0 b) 1.07 | 3.3 | a) 2.0 b) 0.54 |
| Filariasis | | | | | | b) 12.1 | b) 0.01 | b) 10.6 | b) 0.04 | | | |

(1) Morb: Morbidity per 100,000 population. Mort: Mortality per 100,000 population. () Case-fatality according hospital records, (a)(b)(c): Controversial figures according sources of information, Sri Lanka: (a) Cooperative survey by Sri Lanka and USAID, (b) Hospital Statistics, (c) Vertical program. Thailand, (a) Public Health Statistics, (b) Annual Summary Surveillance Report (1981).
 (2) The morbidity of the intestinal parasitic infections is 2,710 and that of skin infections 2,250 in Bangladesh in 1981.
 (3) There is a big discrepancy in the malarial mortality. (durag 1969 ~ 1977): (b) 0.6 ~ 3.6 and (c) less than 0.1.

Appendix 3 CASE-MORALITY OF INFECTIOUS DISEASES

| | Indonesia (1980) | Philippines (1979) | Sri Lanka (1979) | Sri Lanka (1982) | Thailand (1979) | Thailand (1981) |
|----------------|---------------------|-----------------------|---------------------|---------------------|--------------------|--------------------|
| Cholera | 3.8 | 32.2 | 9.0 | 5.6 | 3.1 | 5.1 |
| Acute Diarrhea | 3.1 | 7.7 | 0.8 | 1.1 | 2.8 | 1.3 |
| Dysentery | | 4.9 | 0.5 | 1.4 | 0.13 | 0.04 |
| Foodpoisoning | | 36.4 | 4.0 | 1.1 | 0.14 | 0.07 |
| Enteric Fever | 3.4 | 18.6 | 1.2 | 0.5 | 0.4 | 0.25 |
| Hepatitis | 3.9 | 8.5 | 0.8 | 1.1 | 0.8 | 0.9 |
| Influenza | 0.04 | 0.96 | | 0.01 | 0.0 | 0.0 |
| Pneumonia | | 38.6 | | 5.2 | | |
| Diphtheria | 10 | 52.3 | 32.9 | 13.6 | 29.5 | 41.2 |
| Pertussis | 3.1 | 0.74 | 1.09 | 0.3 | 0.08 | 0.1 |
| Tetanus | 25.4 | 41.9 | 18.9 | 22.8 | 44 | |
| Measles | 3.2 | 19.1 | | 0.17 | 0.14 | 0.08 |
| Poliomyelitis | 2.1 | 33.5 | | 5.3 | 8.3 | 20 |
| Dengue Fever | 4.7 | 12.9 | | | 1.12 | 0.78 |
| Encephalitis | 46.6 | 2.3 | | 11.6 | 66.7 | 60.6 |
| Tuberculosis | 10.4 | 25.9 | 10.1 (21.6) | 5.5 | 52.4 | 39.1 |
| Malaria | 1.5 | 3.7 | | 0.07 | 5.0 | 2.9 |