

**JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)**

**MINISTRY OF HEALTH AND WOMEN'S AFFAIRS
THE DEMOCRATIC SOCIALIST
REPUBLIC OF SRI LANKA**

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR THE DEVELOPMENT
OF
RURAL HOSPITAL, (PHASE II)
IN
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**

OCTOBER 1992

INTERNATIONAL TOTAL ENGINEERING CORPORATION

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BASIC DESIGN STUDY REPORT ON THE PROJECT FOR THE DEVELOPMENT OF RURAL HOSPITAL, (PHASE II) IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

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国際協力事業団

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PREFACE

In response to a request of the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct a basic design study on the Project for Development of Rural Hospital, (Phase II) and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Sri Lanka a study team headed by Ph. D. Noriaki Ono, Director of Department of Medical Engineering Service of Mitsui Memorial Hospital, and constituted by members of International Total Engineering Corporation, from May 6 to June 9, 1992.

The team held discussions with the officials concerned of the Government of Sri Lanka and conducted a field survey at the site of the proposed project. After the team returned to Japan, further studies were made. Then, after going through the explanation and discussion of a draft report of the project with the officials in Sri Lanka from September 24 to October 3, 1992, the present report was prepared.

I hope that this report will serve for the promotion of the project and contribute to the promotion of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their close cooperation extended to the teams.

October, 1992



Kensuke Yanagiya

President

Japan International Cooperation Agency

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Development of Rural Hospital, (Phase II) in the Democratic Socialist Republic of Sri Lanka.

This study has been made by International Total Engineering Corporation in compliance with a contract with JICA, requiring a period of 6.2 months from April 24, 1992 to October 30, 1992. Throughout the study, we have taken into full consideration the present situation of the Democratic Socialist Republic of Sri Lanka and have planned the most appropriate project in the scheme of Japan's grant aid.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, and the Ministry of Health and Welfare. We also wish to express our deep gratitude to the officials concerned of the Ministry of Health and Women's Affairs of Sri Lanka, JICA Sri Lanka office, and Japanese Embassy in Sri Lanka for their close cooperation and assistance during our study.

At last, we hope that this report will be effectively used for the promotion of the project.

October, 1992









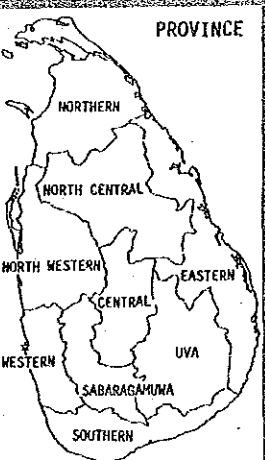
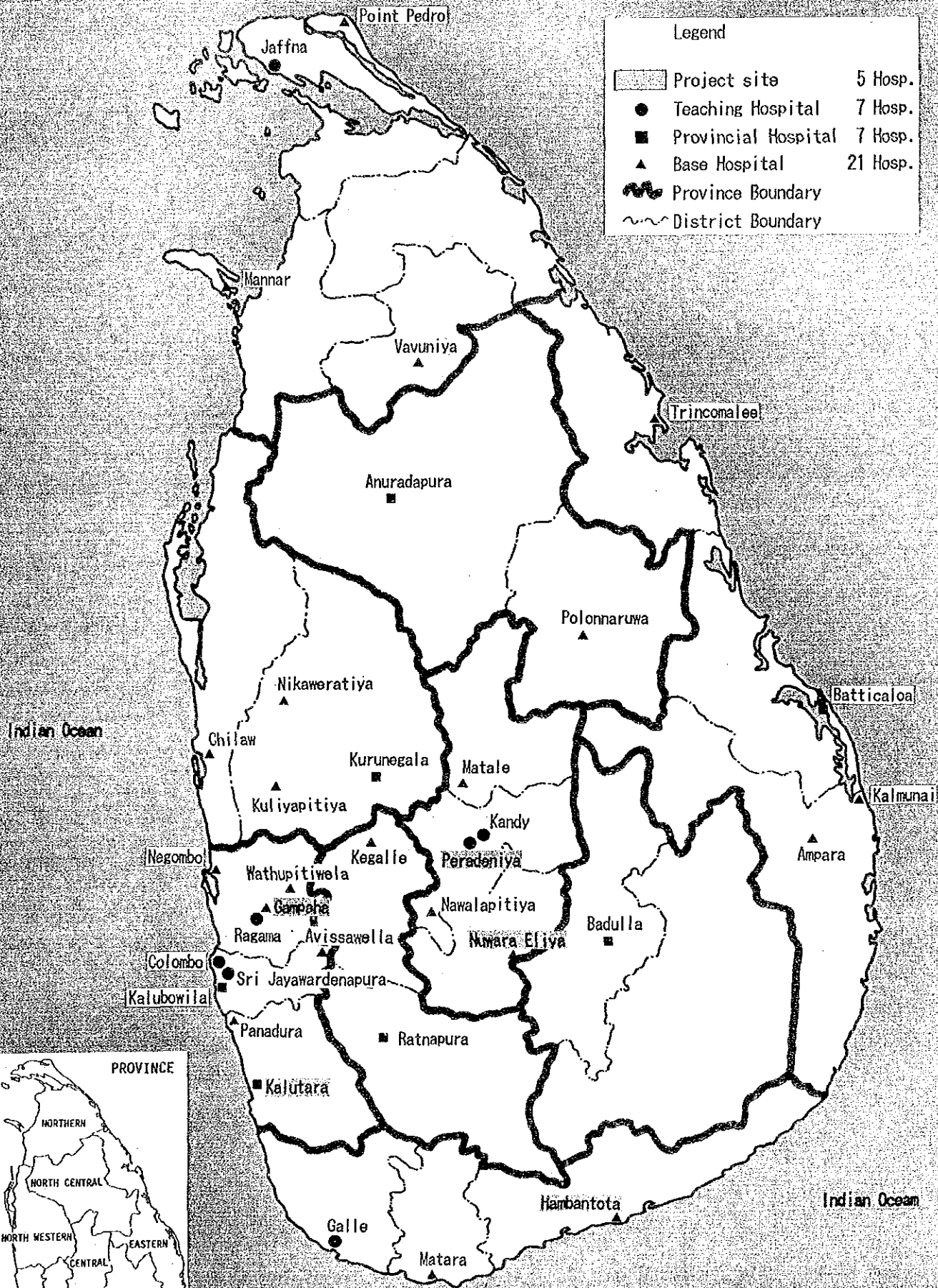
Project Manager, Kazuhiko Iyogi

Basic design study team on
the Project for Development of Rural
Hospital, (Phase II),
International Total Engineering Corporation

LOCATION MAP OF PROJECT SITES

Legend

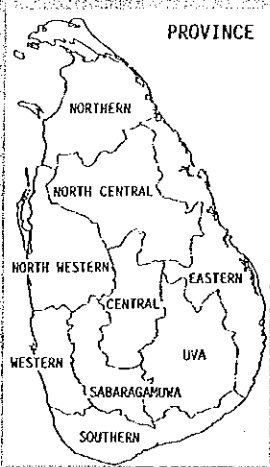
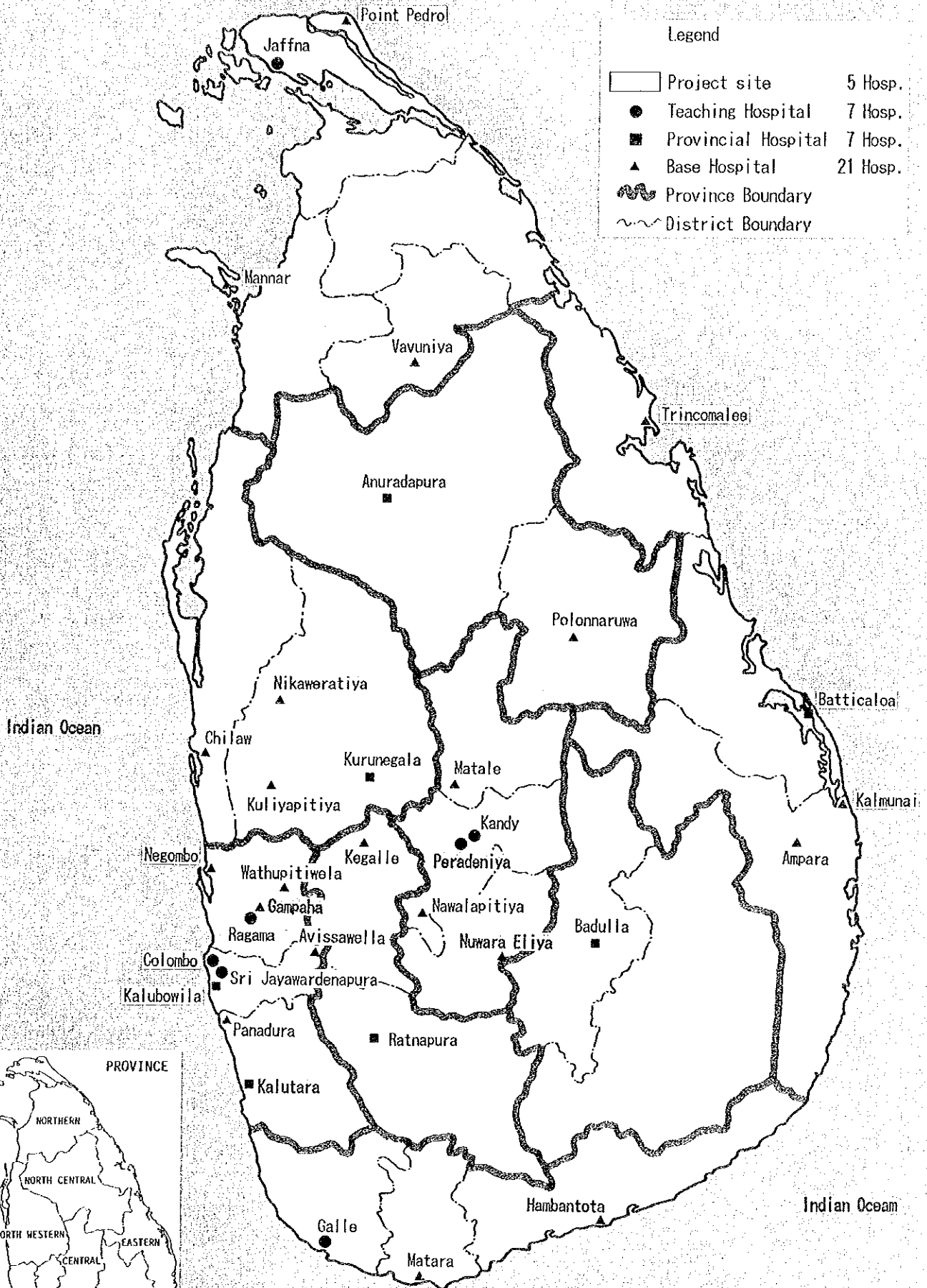
	Project site	5 Hosp.
	Teaching Hospital	7 Hosp.
	Provincial Hospital	7 Hosp.
	Base Hospital	21 Hosp.
	Province Boundary	
	District Boundary	



LOCATION MAP OF PROJECT SITES

Legend

	Project site	5 Hosp.
	Teaching Hospital	7 Hosp.
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	Province Boundary	
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LIST OF ACRONYMS AND ABBREVIATIONS

ADB	Asian Development Bank
BES	Biomedical Engineering Services
FINNIDA	Finnish International Development Agency
GF	Government Factory
IDA	International Development Association
MOH & WA	Ministry of Health & Women's Affairs
MRI	Medical Research Institute
MSD	Medical Supplies Department
MT & SD	Medical Technology & Supplies Department
NIHS	National Institute of Health Sciences
NORAD	Norwegian Agency for Development
SPC	State Pharmaceutical Corporation
TAC	Technical Advisory Committee
TSF & EC	Technical Specification Formulation & Evaluation Committee
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Summary

SUMMARY

The Democratic Socialist Republic of Sri Lanka (hereinafter stated as "Sri Lanka") is an island nation of the tropics, located in Southwest Asia. Its land area is about 64 thousand square kilometers, and the population of the country is about 17 million. Its GNP per capita is small, about US\$430, but it is the largest among the six nations of Southwest Asia.

Since the Sri Lanka gained its independence peacefully from Britain as an independent member of the Commonwealth in 1948, each successive government of Sri Lanka has carried out policies prioritizing social welfare such as education and medical service, and its economy has been growing steadily. However, the long-standing Singhalese-Tamil conflict has turned increasingly violent recently, which is now the biggest problem facing the economy and internal affairs of Sri Lanka.

Since 1980, the government of Sri Lanka has been carrying out a Primary Health Care program (PHC) in accordance with the World Health Organization's Alma-Ata Declaration, placing its priority on improvement of rural hospitals (provincial hospitals and base hospitals), which function as the core of local health and medical care. In carrying out the program, "the Project for Development of Rural Hospital, (Phase I)" (hereinafter called as "Project Phase I") was implemented with a grant from the government of Japan, and the medical equipment of 10 rural hospitals was improved in 1986.

Sri Lanka's health and medical indices are fairly good in comparison with the other nations of Southwest Asia. For example, the average life expectancy of Sri Lankans is 69 years for men and 73 for women, which is 10 - 20 years greater than that of India or other nations of Southwest Asia. In addition, the infant mortality of Sri Lanka is 20 per 1,000 live births, which is quite low in comparison with those of other nations of South-west Asia, which rates are around 100 per 1,000. Moreover, the general mortality rate of Sri Lanka is 6 per 1,000, which is lower than Japan's 7 per 1,000.

Factors contributing to these good health indices are the government policies for the promotion of education and health care that have been implemented since its independence and the success of the aforementioned primary health care program.

However, when the infant mortality is seen by the area, the infant mortality of Nuwara Eliya, located in a mountainous region, is 49.1 per 1,000, which is more than twice the national average. It shows that there are great regional differences in medical care. Furthermore, there are hospitals like Base Hospital, Hambantota, which do not have a surgical section even though they are base hospitals. Their equipment is not sophisticated, and their medical care has not achieved the level of service quality that should be offered at such base hospitals. Excluding the 10 hospitals improved in Project Phase I, there is a shortage of medical equipment in the rural hospitals. Because of wear and tear, there are also large differences in the functions of medical facilities used among those hospitals. Those aforesaid current situations are not improved yet.

To alleviate those problems, the government of Sri Lanka had, at first, conceived of a project to improve the medical equipment of five rural hospitals, a cancer research center, and the Biomedical Engineering Services (BES) of the Ministry of Health and Women's Affairs (hereinafter called "the Line Ministry"). The government of Sri Lanka, naming this project as "the Project for Development of Rural Hospital, (Phase II)", requested the government of Japan for grant aid assistance for the project in August, 1989. In response to this request, the Japanese government dispatched a preliminary study team to Sri Lanka in October, 1990, and the background, contents, etc. of the request was studied. Although improvement of medical equipment those rural hospitals was essential, the study resulted in a recommendation that priority should be given to the establishment of a system which facilitates proper use of medical equipment to be introduced and which enables the maintenance of the equipment as well. In accordance with this result, the Japanese government conducted a basic design study concerning only the improvement project for the BES in March, 1991 and extended a grant aid for the project in fiscal 1991. In expecting the completion of the above mentioned facilities of the BES in March, 1993, the government of Sri Lanka has currently requested the government of Japan for another grant to execute a recomposed project, which will improve the medical equipment of eight rural hospitals, most of the equipment to be installed being maintainable at the facilities.

In response to this request, the government of Japan decided to conduct a basic design study on this project, and JICA dispatched a study team to Sri Lanka in May, 1992. The study team ascertained the background, contents, and executing system of the project through series of discussion with government

officials of Sri Lanka, collected information related to the project, and carried out a field survey on the proposed hospitals.

At first, eight rural hospitals were included in the project requested by the government of Sri Lanka, but the number of the hospitals included in the project was reduced to five with mutual understanding because of the political instability in the Northeastern Provinces. Three hospitals excluded are Batticaloa, Mannar, and Trincomalee.

Upon returning to Japan, the basic design study team analyzed the results of the field survey and made a draft of the basic design study report for the project. After explaining the draft final report to the Sri Lankan officials concerned in September, 1992, this basic design study report has been completed.

This project is to improve the basic medical equipment of the four rural hospitals (provincial hospitals and base hospitals) and one teaching hospital listed below, which function as the core of rural medical care in Sri Lanka.

1. Teaching Hospital, Peradeniya
2. Provincial Hospital, Kalutara (commonly called: Kalutara General Hospital)
3. Base Hospital, Nuwara Eliya
4. Base Hospital, Gampaha
5. Base Hospital, Hambantota

As a principle, the equipment to be procured in this project is to renew the existing equipment that is worn out or is not repairable, and the items of the equipment to be procured are mostly maintainable at the BES or local service agencies of manufactures. The main items are shown in the next page.

LIST OF MAIN REQUESTED EQUIPMENT

	DEPARTMENT	EQUIPMENT
1	OPERATING THEATER	Operating Table, Anesthetic Machine, Electrosurgery Unit, Defibrillator, Operation Microscope etc.
2	STERILIZATION	High Pressure Sterilizer, Bowl Sterilizer, Instrument Sterilizer etc.
3	DIAGNOSTIC EXAMINATION	Centrifuge, Spectrophotometer, Flame photometer, Microscope, Hot Air Sterilizer, Water Distiller etc.
4	X-RAY	Angiography, Basic X-Ray Unit, Mobile X-Ray Unit, C-Arm X-Ray Unit, Film dryer etc.
5	PHYSIOTHERAPY	Interferencial Therapy Unit, Ultrasonic Therapy Unit, Shortwave Therapy Unit, Wax Bath etc.
6	OUT PATIENT	Slit Lamp, Visual Field Analyzer, Ultrasonic Scanner, ECG, Spirometer, Echo Cardiogram
7	OBSTETRIC & GYNECOLOGY	Foetal Heart Monitor, Foetal Heart Detector, Vacuum Extractor, Infant Incubator, Neo-Natal Monitor, Phototherapy Unit, Infant Warmer etc.
8	ICU	Patient Monitor, Therapeutic Ventilator, etc.
9	BLOOD BANK	Blood Bank Refrigerator
10	OTHER	Mortuary Refrigerator, Air Conditioner, Generator etc

To implement this project, the amount to be borne by the government of Sri Lanka is estimated at approx. Rs. 355 thousand (1.1 million yen) . In addition, about Rs. 8.5 million yen a year is expected to be funded by the government of Sri Lanka for the maintenance of the equipment procured in this project (spare parts, consumables, etc.). This amount is equivalent to about 18% of the maintenance expenses of the Line Ministry in 1991, so it is bearable by the Sri Lankan side. The period required for the implementation of the project, from the conclusion of the supply contract with a supplier for the conclusion of the Supply contract to be procured to the completion of the installation work, is about seven months.

For the implementation of the project, the Line Ministry is the responsible authority of the Sri Lankan side. The project will be supervised by the Department of Health Services of the Line Ministry and carried out by the BES.

If appropriate management is executed by the Sri Lankan side in implementing this project, then the following effects can be expected.

1. It is possible to strengthen the function of medical examination and treatment performed at the hospitals included in this project, which function is now weak, by utilizing the equipment procured in the project. Thereby, it is also possible to rectify the differences in medical services provided among facilities and localities now existing in Sri Lanka, which will further lead to the promotion of the primary health care program. Thus, this project is expected to greatly contribute to the health of the people of Sri Lanka.
2. Besides the improvement of the function of medical examination and treatment, the educational function of two of the hospitals, Teaching Hospital, Peradeniya and Provincial Hospital, Kalutara will be strengthened to develop personnel to engage in medical care as well as to improve the quality of medical education, both of which will result in improvement of medical services offered to patients.

As described, since great effects are expected, it is appropriate and meaningful that this project is to be carried out through a grant aid assistance offered by the government of Japan.

The following recommendations are presented so that the project can be carried out smoothly and that the equipment procured can be utilized effectively for a long period of time.

1. The government of Sri Lanka should arrange budgetary allocations for the above mentioned fund to be borne by the Sri Lanka side and for the maintenance expenses, which are expected to increase due to the procurement in this project. In addition to that, it is also necessary that budgetary arrangement be made in consideration of the depreciation of the equipment over a long period in preparation for a future project after the termination of the equipment's service time (5 - 6 years).
2. Efforts should be made to establish a medical-equipment maintenance system by the BES as early as possible. Such a system will surely play an important role in this project.

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Chapter 1 Introduction

Chapter 1 Introduction

The government of Sri Lanka conceived of a project to improve the medical equipment of five rural hospitals, a cancer research center, and the Biomedical Engineering Services (BES) of the Ministry of Health and Women's Affairs, and, naming this project as "the Project for Development of Rural Hospital (Phase II)", requested the government of Japan for grant aid assistance for the project in August, 1989. In response to this request, the Japanese government dispatched a preliminary study team to Sri Lanka in October, 1990, and the background, contents, etc. of the request was studied. Although the medical-equipment improvement of those rural hospitals was essential, the study resulted in a recommendation that priority should be given to the establishment of a system which facilitates proper use of medical equipment to be introduced and which also enables the maintenance of the equipment. In accordance with this result, the Japanese government conducted a basic design study concerning only the improvement project for the BES in March, 1991 and offered a grant aid for the project in fiscal 1991.

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In response to this request, the government of Japan decided to conduct a basic design study on this project, and the Japan International Cooperation Agency (JICA) dispatched a study team headed by Ph. D., Noriaki Ono, Director of Department of Medical Engineering Service of Mitsui Memorial Hospital, to Sri Lanka from May 6 to June 9, 1992.

The objectives of this basic design study are to determine the need and propriety of the project and to carry out a basic design of the scope, size, and equipment that can be most effectively realized with assistance from the Japanese government.

Upon completing the field survey, in which discussion were held with government officials of Sri Lanka and the project sites were studied, the basic design study team, returning to Japan, analyzed the results of the field survey and compiled the basic design and draft final report for this project. Then, the study team, headed by Ph. D., Noriaki Ono, was again dispatched by JICA from September 24 to October 3, 1992 to explain the draft final report to the Sri Lankan officials concerned and to discuss the contents of the report

with them. This basic design study report is the summary resulted from those processes in mutual agreement with the Sri Lankan side.

At the end of this report, attached are copies of a description of the study team, the schedule of the field survey, a list of principal officials interviewed, and the Minutes of the Discussions held with those officials.

Chapter 2 Background of the Project

Chapter 2 Background of the Project

2-1 Present State of Sri Lanka

The Sri Lanka is an island nation, which has numerous coastal lagoons. Its land area is 65,610 square kilometers including 982 square kilometers for those lagoons. It lies in the central part of the Indian Ocean, more specifically at the section from 5 degrees to 9 degrees North and from 79 degrees to 81 degrees East.

The island extends 445 kilometers northwestward, and its maximum width is 225.3 kilometers. There is a mountainous region at the central part of the island, which peaks to 2,545 meters above sea level, and plains surround that mountainous region. The shape of the island is oval, narrow at the north and getting wider to the east, west, and south. There are numerous rivers originating radially from the central heights through the plains and flowing into the ocean.

The climate of the country is affected by its location, which is in the monsoon belt of the Indian Ocean and close to the equator, and by its topography, which has areas high above sea level. Rainfall varies depending on regions. There is sufficient precipitation in the hilly regions and in the southwestern region whereas the remaining northern, north central, and eastern regions are dry throughout most of the year. Temperatures average between 26 and 28 degrees centigrade in the lowlands, and between 14 and 24 degrees in the hilly regions.

One fifth of the total land area is for woods and forest reserves, and one fourth is used for agriculture.

The history of Sri Lanka began when the Singhalese migrated from Northern India to Sri Lanka about 2,500 years ago. Then, 400 years later, the Tamil from Southern India immigrated into the island. The Singhalese built a highly sophisticated civilization based on a Buddhist culture while the Tamil established a Hindu kingdom to compete with the Singhalese. In the 16th and 17th centuries, first arrived are the Portuguese, and then the Dutch controlled most of the island. Turning into the 19th century, the British ousted the Dutch and controlled the island for colonization. The country became an independent and autonomous nation, named "Ceylon", as a member of the British Commonwealth of Nations in 1948. The name of the country was changed to "the Republic of Sri Lanka" in 1972, and again to "the Democratic Socialist

Republic of Sri Lanka" in 1978, which is now officially applied.

The economy of the country is supported mainly by agriculture. Tea, rubber, and coconuts are main export crops, and rice is a staple for domestic consumption.

The country is divided into 9 provinces and 25 districts. Those provinces are: Eastern, Western, Southern, Northern, Central, North Western, North Central, Sabaragamuwa, and Uva. The power of those local governments is increasing because of recent government policies.

The form of governing applied in Sri Lanka is a system of parliamentary democracy. The sovereignty rests with the people, the legislative power is with the parliament, and the administrative authority is executed by the cabinet, in which the president is chief. In the Ministry of Health and Women's Affairs (hereinafter named as "the Line Ministry"), the minister has a commanding power.

The economy of Sri Lanka has grown relatively steadily in the last few years. However, because of the long-standing Sinhalese-Tamil conflict, the achieving of political stability and the promotion of economic development is now disrupted.

The general information of Sri Lanka is summarized in the table below.

2-2 Present State of the Nation's Health and Medical Care

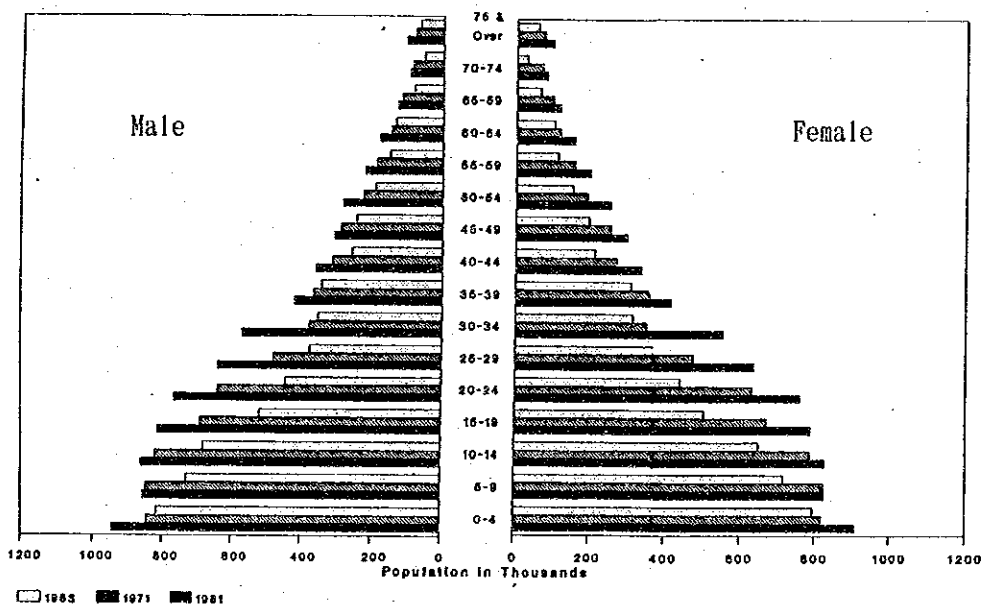
2-2-1 State of the Health and Medical Care

(1) Demography

The annual population growth of Sri Lanka is 1.1% as shown in Table 2-2 on the next page, which is relatively low and comparable to those of advanced nations.

At present, the population is about 17 million (estimated in 1990), and about 50% of the population is concentrated in Central Province, Western Province, and Sabaragamuwa Province, all of which have big cities. The pattern is clearly an urban concentration. In 1963, the population structure by age group took the shape of a pyramid, which is typical of developing countries. However, the birth rate and mortality had declined since, and in 1981, the population structure was gradually shifting into that of an urban city.

Fig. 2-1 AGE PYRAMID 1963, 1971 & 1981



Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

Table 2-2 INDICIES OF HEALTH AND MEDICAL CARE

Country \ Year	Average Annual Growth Rate of Population(%)			Crude Birth Rate (P. 1,000 Pop.)		Crude Mortality Rate (P. 1,000 Pop.)		Life Expectancy at Birth			
	1965 ~80	1980 ~89	1989 2000	1965	1989	1965	1989	Female		Male	
SRI LANKA	1.8	1.5	1.1	33	21	8	6	64	73	63	69
INDIA	2.3	2.1	1.7	45	31	20	11	44	59	46	58
PAKISTAN	3.1	3.2	3.2	48	46	21	12	45	55	47	55
BANGLADESH	2.7	2.6	2.1	47	37	21	14	44	51	45	52
NEPAL	2.4	2.6	2.5	46	41	24	15	40	51	41	52
BHUTAN	1.6	2.1	2.4	42	39	23	17	40	48	41	49
CAMBODIA	0.3	-	-	44	-	20	-	46	-	43	-
VIETNAM	-	2.1	2.2	-	32	-	7	-	69	-	64
THAILAND	2.9	1.9	1.3	41	22	10	7	58	68	54	64
JAPAN	1.2	0.6	0.4	19	11	7	7	73	82	68	76

Country \ Year	Infant Mortality Rate (Per 1,000 Live births)		Child Mortality Rate(1-5yrs) (Per 1,000 Live births)		Population (Per One Doctor)		Population (Per One Nurse)	
	1965	1989	Female	Male	1965	1984	1965	1984
SRI LANKA	63	20	22	28	5,820	5,520	3,220	1,290
INDIA	150	95	134	118	4,880	2,520	6,500	1,700
PAKISTAN	149	106	139	133	-	2,910	9,910	4,900
BANGLADESH	144	106	162	146	8,100	6,730	-	8,980
NEPAL	171	124	187	178	4,618	30,220	87,650	4,680
BHUTAN	171	125	187	180	-	9,730	-	-
CAMBODIA	134	-	-	-	22,410	-	3,670	-
VIETNAM	-	43	48	61	-	950	-	590
THAILAND	88	28	29	39	7,160	6,290	4,970	710
JAPAN	18	4	6	7	970	660	410	180

- Unknown

Source : World Developing Report (IBRD 1991)

(2) Level of Health Care

As seen in Table 2-2, "Indices of Health and Medical Care", the average life expectancy of the Sri Lankans is 69 years for men and 73 years for women. The birth rate is 21 per 1,000 people a year, and the crude death rate is 6 per 1,000. These indices are close to those of advanced nations. The infant mortality is 20 per 1,000 live births. The table below shows main causes of hospitalization along with their frequency of incidence.

Respiratory disease is ranked at the top of the main causes of hospitalization. Then, "unknown" is listed at the second with 8.9% of frequency. The main cause of this "unknown" is considered due to insufficient examinations performed in the hospitals. Epidemic enteritis ranked at the fourth is a major disease prevalent all over Sri Lanka, and it is the second major disease in Nuwara Eliya District. Malaria is the fifth when it is seen over the whole country, but it is the most prevalent disease in northern drylands like Anuradapura and Polonnaruwa.

As for the disease pattern of outpatients, it is seen that 25% of the outpatients are affected with infectious and parasitic diseases and 18% are with respiratory diseases, according to the "Research on Medical Personnel", which was carried out in three districts, Anuradapura, Ratnapura, and Kegalle, in 1971 - 1973.

Table 2-3 LEADING CAUSES OF HOSPITALIZATION. 1990

Rank Order	Diseases	Cases	% of total cases	Cases per 100,000 population
1	Diseases of the respiratory system, excluding the bronchitis pneumonia, bronchopneumonia and influenza	211,384	10.7	1457.5
2	Symptoms, signs and ill-defined conditions	176,268	8.9	1215.4
3	Traumatic injuries	160,432	8.1	1106.2
4	Intestinal infectious diseases	121,464	6.2	837.5
5	Malaria	98,466	5.0	678.9
6	Viral diseases	92,882	4.7	640.4
7	Diseases of the musculoskeletal system and connective tissue	81,955	4.2	565.1
8	Diseases of the skin and subcutaneous tissue	68,378	3.5	471.5
9	Diseases of the gastro-intestinal tract	67,378	3.4	464.6
10	Other injuries and early complications of trauma	56,757	2.9	391.3
11	Diseases of the urinary system	48,878	2.5	337.0

* Excludes Northern and Eastern Provinces

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

The major cause of death in the hospitals is ischemic heart-disease, and the second is cerebrovascular disease. Those two cardiovascular diseases together cause 20% of the total number of deaths in the hospitals. In addition, neoplasm is the third with 7.1%. This trend is similar to those of developed countries.

However, pulmonary vascular disease and gastrointestinal disease are the fourth and fifth causes of death in the hospitals, and respiratory disease and pneumonia are listed as the ninth and tenth. Together those diseases occupy 23%, a large share of the deaths experienced in the hospitals, which shows that the disease pattern of the country is, contrary to the above mentioned trend, still similar to those of developing countries.

As Sri Lanka is an agricultural country, there are many cases of insecticide poisoning. Since 1986, it has been listed as the sixth cause of death, but, in 1990, it was the most prevalent cause of death experienced in the hospitals in Hambantota, Kurunegala, and Anuradapura. The intoxication from poisonous snakes is not listed among the ten major causes of death, but it is the fourth to sixth in Anuradapura District in the north. As for the causes of death among infants, major ones are gastrointestinal disease, respiratory disease, infectious diseases, and parasitic disease.

Table 2-4 LEADING CAUSES OF HOSPITAL DEATHS 1990

Bank Order	Diseases	Deaths	% of total deaths	Deaths per 100,000 population
1	Ischaemic heart diseases	2,192	10.8	15.1
2	Cerebrovascular diseases	1,670	8.2	11.5
3	Malignant neoplasms	1,434	7.1	9.9
4	Diseases of the pulmonary circulation and other forms of heart diseases	1,414	7.0	9.7
5	Diseases of the gastrointestinal tract	1,328	6.6	9.2
6	Pesticide poisoning	1,275	6.3	8.8
7	Traumatic injuries	1,087	5.4	7.5
8	Signs, symptoms and illdefined conditions	1,023	5.0	7.0
9	Diseases of the respiratory system, excluding bronchitis, pneumonia, bronchopneumonia and influenza	975	4.8	6.7
10	Pneumonia and broncho pneumonia	933	4.6	6.4
11	Slow fetal growth, fetal malnutrition and immaturity	743	3.7	5.1

* Excludes Northern and Eastern Provinces

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

There are health and medical indices in Table 2-5, indicating the conditions of medical care in each district. As seen in the table, Nuwara Eliya District has the worst indices in the crude death rate, infant mortality rate, and neonatal mortality rate. This shows that the district, because of its location in the mountainous region, is in an acute shortage of medical care. In comparison, in Colombo District, in which the capital and largest city is located, the indices for those rates are also higher than the national averages. This is not an indication of poor medical care. The statistics count and include the patients coming from the neighboring districts such as Gampaha and Kalutara into the patients of Colombo District.

Table 2-5 INDICES OF HEALTH AND MEDICAL CARE IN EACH DISTRICT

District	Crude Birth Rate 1989*	Crude Death Rate 1989*	Maternal Mortality Rate 1986*	Infant Mortality Rate 1986*	Neo-natal Mortality Rate 1985
SRI LANKA	21.3	6.2	0.5	23.2	16.2
Colombo	22.2	8.9	0.3	30.0	22.5
Gampaha	15.4	6.0	0.2	16.7	12.6
Kalutara	18.5	6.0	0.3	21.5	15.2
Kandy	22.4	6.8	0.8	31.7	25.0
Matale	21.8	5.8	0.6	15.8	9.9
Nuwara Eliya	27.8	9.1	0.6	49.1	32.1
Galle	20.8	6.2	0.5	20.2	10.9
Matara	22.7	6.2	0.5	22.7	14.7
Hambantota	21.1	4.7	0.3	11.4	8.8
Jaffna	17.4	4.1	0.5	16.6	11.0
Mannar	27.2	5.6	0.4	16.5	7.6
Vavuniya	21.3	5.1	1.7	9.7	8.5
Mullaitivu	21.9	5.6	1.0	11.1	5.5
Batticaloa	28.0	7.9	0.8	15.9	9.3
Ampara	24.5	5.1	0.3	14.0	4.7
Trincomalee	20.7	5.5	1.1	7.7	6.1
Kurunegala	20.7	5.9	0.4	23.8	18.3
Puttalam	21.5	5.3	0.5	19.7	12.6
Anuradhapura	23.0	5.3	0.7	26.1	17.2
Polonnaruwa	20.3	4.7	0.9	16.5	4.4
Badulla	25.6	6.3	0.3	27.3	21.7
Moneragala	22.8	4.2	0.4	9.1	6.0
Ratnapura	24.9	5.5	0.3	29.0	22.8
Kegalle	16.4	6.1	0.0	19.4	14.5

* Provisional

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

Table 2-6 shows the trend of disease from 1970 to 1990. As seen in the table, the incidence of hypertension and ischemic heart-disease is rapidly increasing. Probably, this trend is caused by changes in the public life-style.

The decreases seen in the incidence of infections such as tuberculosis, diphtheria, whooping cough, and measles are mainly the results of the Expansion Program of Immunization effectively implemented by the government.

Table 2-6 TRENDS IN HOSPITALIZATION AND HOSPITAL DEATHS FOR SELECTED DISEASES 1970-1990

Diseases	Cases per 100,000 population					Deaths per 100,000 population				
	1970	1975	1980	1985	1990*	1970	1975	1980	1985	1990*
Intestinal Infections	948.6	969.8	955.4	849.1	837.5	19.3	18.6	10.3	7.3	3.0
Tuberculosis (all forms)	102.6	114.1	76.2	74.0	80.8	6.6	8.3	4.3	3.9	3.5
Diphtheria	7.6	2.3	0.3	0.1	0.0	0.6	0.3	0.0	0.0	0.0
Whooping Cough	13.2	9.9	3.7	3.4	1.9	0.1	0.1	0.0	0.0	0.0
Measles	32.6	37.0	34.1	59.3	27.6	0.1	0.0	0.1	0.1	0.0
Viral Hepatitis	61.4	109.8	31.7	41.9	40.9	1.1	1.4	0.4	0.4	0.4
Malaria	778.9	800.3	344.5	437.1	678.9	0.6	0.9	0.2	0.2	0.5
Helminthiasis	516.5	230.5	207.4	112.0	37.9	3.5	1.6	0.5	0.4	0.1
Nutritional Deficiencies	151.4	197.7	134.4	109.2	24.8	1.7	10.4	1.3	1.3	0.4
Anaemias	507.8	430.8	334.8	277.5	154.9	5.7	9.4	3.3	2.2	1.0
Hypertensive Diseases	109.4	121.6	182.7	186.8	200.7	3.7	6.0	4.9	4.5	3.6
Ischeamic Heart diseases	57.3	76.4	117.3	163.9	163.2	5.6	7.6	12.5	15.9	15.1
Abortions**	675.3	829.4	869.5	811.3	846.2	1.3	1.1	0.3	0.3	0.3

* Excludes Northern and Eastern Provinces

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1992

** Per 100,000 female population of the reproductive age group

2-2-2 Organization of the Ministry of Health and Women's Affairs

In the field of medical care, the Line Ministry, which is the administrative organ of the government, plays the major role for the health and medical care of Sri Lanka. Details of the private sector in the health and medical care are not clear, but the share of the private sector is probably small. As seen in Figure 2-2, "Organization of the Ministry of Health and Women's Affairs", the ministry is composed of eight agencies and is in charge of all the administration concerning health and medical care.

The Line Ministry has the Medical Technology and Supplies Department (MT&SD) and the Medical Supplies Department (MSD) under the Clinical Testing Service Agency, one of its 8 agencies. The distribution of medicines and medical items is carried out by the State Pharmaceutical Corporation (SPC), and the maintenance and repair work of medical equipment is carried out by the Biomedical Engineering Services (BES).

In 1989, the total number of hospital beds under the jurisdiction of the Ministry of Health and Women's Affairs is 46,620, i.e., there are 2.8 hospital beds per 1,000 people, or 357 people per bed.

Since 1989, many functions of the Line Ministry have been transferred to the provincial health ministries of the nine provinces of the country. Therefore, the current administration of health and medical care is a two-step structure, in which one is carried out by the provincial ministries and the other directly by the Line Ministry.

Fig.2-3 describes the organization of one of the provincial ministries, and Table 2-7 lists the population and land area of each province or district.

Fig. 2-2 ORGANIZATION CHART OF MINISTRY OF HEALTH & WOMEN'S AFFAIRS

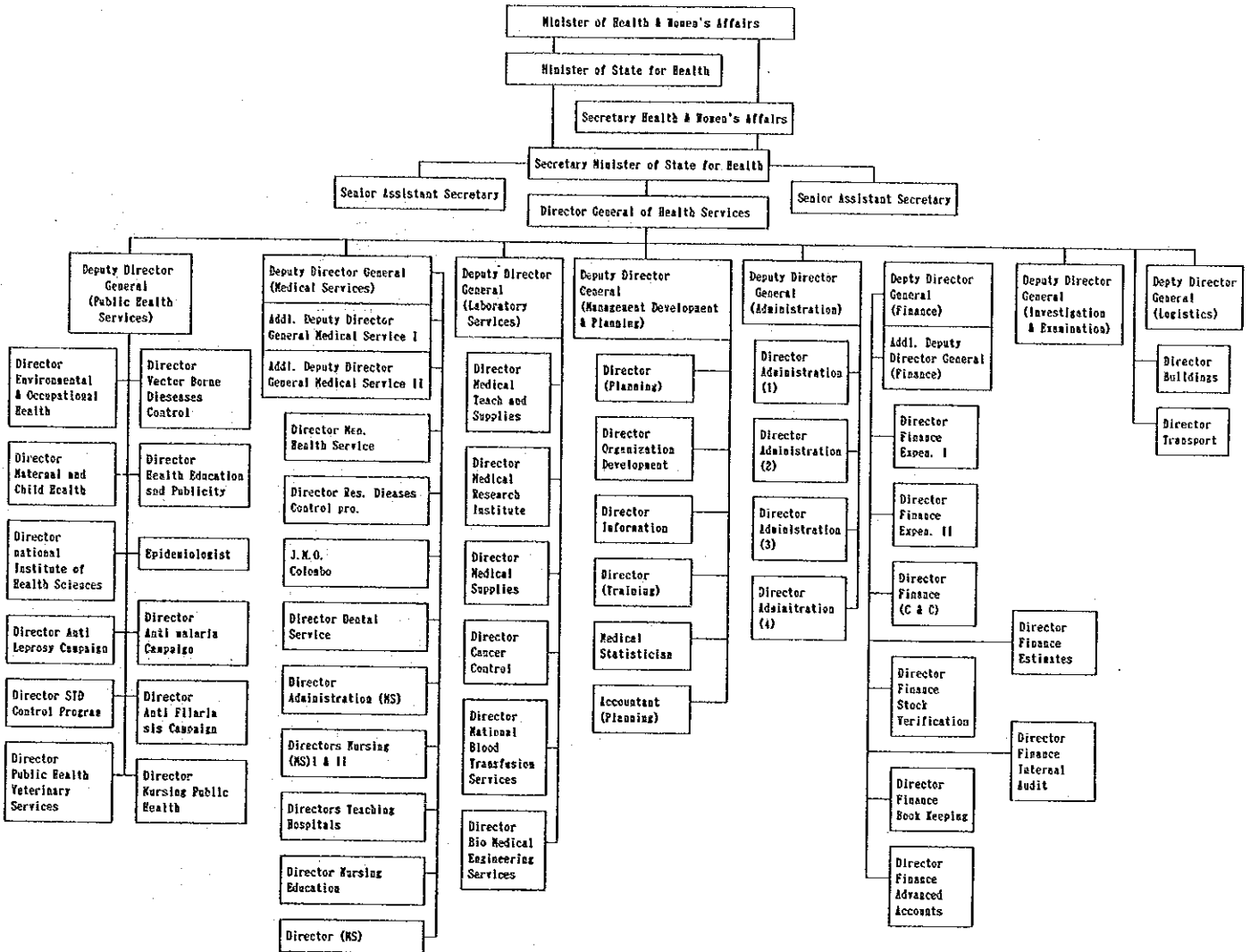


Fig. 2-3 ORGANIZATION CHART OF HEALTH SERVICES UNDER PROVINCIAL COUNCILS

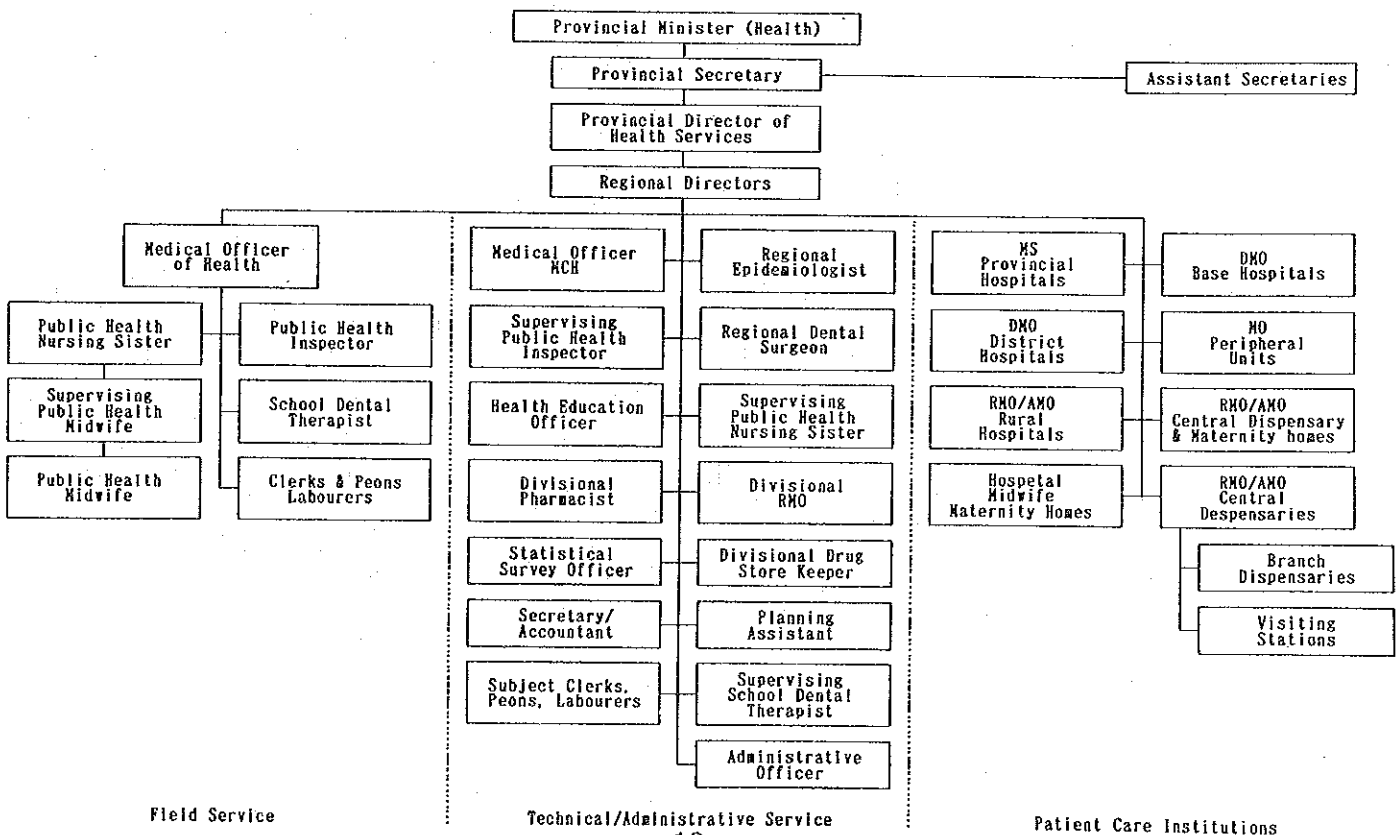


Table 2-7 POPULATION, AREA AND DENSITY OF PROVINCES AND DISTRICTS

Administrative Area (Province/District)	Population Census 1981*					Estimated Mid-year population in '000	
	Land area (km ²)	Percentage land area (%)	Population	Population Density Persons per km ²	Percentage distribution of population	1990**	1991***
SRI LANKA	64,652	100.00	14,846,750	230	100.00	16,993	17,276
Western Province	3,658	5.7	3,919,807	1072	26.4	4,387	4,458
Colombo	652	1.0	1,699,241	2605	11.4	1,935	1,960
Gampaha	1,399	2.2	1,390,862	994	9.4	1,518	1,548
Kalutara	1,607	2.5	829,704	516	5.6	934	950
Central Province	5,583	8.6	2,009,248	360	13.5	2,180	2,261
Kandy	1,891	2.9	1,048,317	554	7.1	1,236	1,284
Matale	1,988	3.1	357,354	180	2.4	414	426
Nuwara Eliya	1,704	2.6	603,577	354	4.1	530	551
Southern Province	5,513	8.5	1,882,661	341	12.7	2,207	2,217
Galle	1,674	2.6	814,531	487	5.5	932	936
Matara	1,246	1.9	643,786	516	4.3	765	769
Hambantota	2,593	4.0	424,344	164	2.9	510	512
Northern Province	8,685	13.4	1,109,404	128	7.5	1,296	1,320
Jaffna	2,072	3.2	830,552	401	5.6	962	982
Mannar	2,002	3.1	106,235	53	0.7	129	129
Vauniya	2,645	4.1	95,428	36	0.6	114	115
Mullaitivu	1,966	3.0	77,189	39	0.5	91	94
Eastern Province	9,622	14.9	975,251	101	6.6	1,194	1,200
Batticaloa	2,465	3.8	330,333	134	2.2	409	412
Amparai	4,539	7.0	388,970	86	2.6	474	476
Trincomalee	2,618	4.0	255,948	98	1.7	311	312
North-Western Province	7,750	12.0	1,704,334	220	11.5	1,999	2,022
Kurunegala	4,773	7.4	1,211,801	254	8.2	1,410	1,426
Puttalam	2,977	4.6	492,533	165	3.3	589	596
North-Central Province	10,533	16.3	849,492	81	5.7	1,019	1,020
Anuradhapura	7,129	11.0	587,929	82	4.0	705	706
Polonnaruwa	3,404	5.3	261,563	77	1.8	314	314
Uva Province	8,405	13.0	941,522	109	6.2	1,045	1,080
Badulla	2,818	4.4	640,952	227	4.3	701	724
Moneragala	5,587	8.6	273,570	49	1.9	344	356
Sabaragamuwa Province	4,902	7.6	1,482,031	302	10.0	1,666	1,698
Ratnapura	3,239	5.0	797,087	246	5.4	923	936
Kegalle	1,663	2.6	684,944	412	4.6	743	762

* Department of Census & Statistics

** Registrar General's Department

*** Medical Statistics Unit

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

2-2-3 Budget of the Ministry of Health and Women's Affairs

Table 2-8 shows changes in the annual budget of the Line Ministry. The ratio of the annual budget of the Line Ministry to the annual national budget has been on the increase, the rate of increase being about 4% in 1985, about 5.4% in 1987, and about 6.1% in 1989. Since 1990, however, because of the Singhalese-Tamil conflict, the annual budget of the Line Ministry has been decreasing.

Table 2-9 is the account of the expenditure of the Line Ministry in 1991. The Line Ministry receives a budgetary allocation for the maintenance of medical equipment. It is also possible for the Line Ministry to receive another allocation by the end of the fiscal year if unexpected expenses are encountered. It is noticed, from changes in the expenses, that appropriate budgetary allocation has been executed for health and medical care.

In 1991, 6.2% of the budget, about Rs.290 million, was allocated for the purchase of medical equipment, and 1.0%, about Rs.48.4 million for the maintenance of medical equipment.

If a base hospital (Nuwara Eliya, Gampaha, or Hambantota) encounters an expenditure which requires more funds, the regional director of health services responsible for the hospital explains the need and makes a request to the secretary of the provincial ministry of health, under which the hospital is organized. If the secretary considers the request appropriate, then, after the provincial council's approval, the request is passed from the provincial government onto the Line Ministry for an additional fund. If the Line Ministry judges it appropriate, then a budgetary reallocation is made at by the financial department of the Line Ministry.

If a hospital that is under the direct control of the Line Ministry (Teaching Hospital, Peradeniya or Provincial Hospital, Kalutara) runs out of funds, then the director of the hospital explains the reasons of the shortage of funds directly to the Director General of Health Services of the Line Ministry. If judged that a budgetary revision is necessary, the allocation of an additional fund is requested to the financial department of the ministry. Then, the financial department revises the budget.

Table 2-8 EXPENDITURE ON HEALTH (1983 - 1991) Rs. Million (Japanese Yen Million)

	1985	1987	1989	1990*	1991**
Total Government Expenditure	67,103.0 (208,019)	67,829.2 (210,271)	77,634.0 (240,666)	90,932.0 (281,889)	139,000.0 (430,900)
Expenditure on Health	2,750.9 (8,525)	3,711.0 (11,504)	5,038.4 (15,619)	5,382.5 (16,686)	4,690.0 (14,539)
Health expenditure as a % of Government Expenditure(Actual)	4.1	5.5	6.5	5.9	3.4

* Provisional
 ** MOH & WA Statistics
 1Rs. \approx 3.10 Yen)

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

Table 2-9 ALLOCATION OF MOH EXPENDITURE (1991) Rs. Million (Japanese Yen Million)

Item	Expenditure		%
	Rs. Million	(Yen. Million)	
Personnel Expenses	1,876	(5,816)	40.0
Medicine	420	(1,302)	9.0
Reagents & Consumables	2.0	(62)	0.4
Purchase of Medical Equipment (Line Minister)	220	(682)	4.7
Purchase of Medical Equipment (Provincial Minister)	70	(217)	1.5
Maintenance of Equipment	48	(149)	1.0
Others	2,036	(6,311)	43.4
Total	4,690	(14,539)	100

(1Rs. \approx 3.10 Yen)

Source : MOH & WA Statistics

2-2-4 Health and Medical Service

The government of Sri Lanka provides the people with free medical care. The government is targeting the achieving of "Health for All by the year 2,000" and its major policy in reaching that goal is the Primary Health Care Program.

According to the report of the research carried out in 1971 through 1973 on medical-care personnel distribution, public medical-care facilities, which offer free medical care, exist within 4.8 kilometers from each family.

The health and medical services provided in Sri Lanka can be categorized into two groups. One group is medical examinations and treatments, and the other is public health services for the prevention of diseases.

(1) Categorization of Medical Services Provided at Medical Facilities under the control of the Ministry of Health and Women's affairs

Table 2-10 shows categories of medical-service facilities, levels of medical care offered, the number of facilities for each category of facilities, and the number of hospital beds in each category. The facilities providing medical care from primary care to tertiary care are classified into eight categories. As for jurisdiction, teaching hospitals are under the direct control of the Line Ministry, and most of the hospitals smaller than the provincial hospitals are under the control of the provincial Ministries of Health. However, there are provincial hospitals which are directly controlled by the Line Ministry, like Provincial Hospital, Kalutara and Provincial Hospital, Colombo (South). There is no categorization under the name of "General Hospital" in the table. However, there are hospitals called "General Hospital" like Provincial Hospital Kalutara and Sri Jayawardenapura Teaching Hospital.

Table 2-10 HEALTH FACILITIES

Supervising Ministry	Category	Levels of Medical Care	No. of Facilities	No. of Beds
Ministry of Health & Women's Affairs	Teaching Hospital	Tertiary	11 (7 General Hospital) (4 General Hospital)	10,023
Provincial Ministry of Health	Provincial Hospital	Secondary, Tertiary	7	5,131
	Base Hospital	Secondary	21	6,371
	District Hospital	Secondary	120	11,521
	Peripheral Hospital	Primary	122	5,162
	Rural Hospital	Primary	119	2,778
	Central Hospital	Primary	361	0
	Maternity Hospital	Primary	83	83

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

1) Teaching Hospitals

There are a total of eleven teaching hospitals: seven as a general hospital and four as a special hospital. They are under the direct control of the Line Ministry in organization. There were a total of 10,023 hospital beds in those teaching hospitals in 1989. The size of each teaching hospital is shown in Table 2-11, below.

General Hospital, Colombo, which is the largest hospital in Sri Lanka, owns 2,395 beds and has many departments such as neurology and cardiovascular surgery. Furthermore, the hospital has an emergency department and ICU's, which have been added with assistance offered by Finland (FINNIDA). However, the hospital lacks such departments as pediatrics, gynecology, ophthalmology, and oral surgery.

As a special hospital, there are a children hospital, an Eye hospital, a dental hospital and two obstetric hospitals.

Table 2-11 LIST OF TEACHING HOSPITALS

Name of Hospital		Number of Beds	Number of Doctors
General Hospital	1. Sri Jayawardenepura	1,000	N. A
	2. Colombo	2,395	527
	3. Colombo North, Regama	1,100	95
	4. Galle	1,040	70
	5. Kandy	1,509	105
	6. Peradeniya	561	39
	7. Jaffna	910	55
Special Hospital	8. Maternity Hospital	353	35
	① De Soya ② Castke Street		
	9. Children lady Ridgeway Hospital	640	83
	10. Eye Hospital	471	34
11. Dental Hospital	44	10	
Total		10,023	N. A

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1989

2) Provincial Hospitals

Provincial hospitals are located in major provincial cities of Sri Lanka. Five provincial hospitals are under the control of provincial governments, but Provincial Hospital, Kalutara and Provincial Hospital, Colombo (Southe) are under the direct control of the Line Ministry. There were a total of 5,131 hospital beds in those provincial hospitals in 1989. Among those hospitals, Provincial Hospital, Kurunegala is the largest, and it had 979 beds in 1989.

Those hospitals are general hospitals having such specialized departments as internal medicine, surgery, and obstetrics and gynecology. In addition to those departments, they have relatively well equipped clinical laboratories and serve secondary and tertiary medical care in the provinces. Table 2-12, below, shows the sizes of the provincial hospitals.

Table 2-12 LIST OF PROVINCIAL HOSPITALS

Control	Name of Hospital	Number of Beds	Number of Doctors
Line Ministry	1. Colombo South	624	96
	2. Kalutara	578	49
Provincial Ministry	3. Batticaloa	618	19
	4. Kurunegala	979	49
	5. Anuradhapura	794	36
	6. Badulla	693	34
	7. Ratnapura	864	47
Total		5,131	330

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1989

3) Base Hospitals

Base hospitals are located in relatively big cities, and they provide secondary medical care. The base hospitals are all under the control of their respective provincial governments.

Their sizes are very different from one another. Among those hospitals, the largest is Base Hospital Matara, which has 621 hospital beds. The smallest is Base Hospital Hambantota, which has 156 beds. The items of medical care offered at those hospitals are also not uniform. Some hospitals have clinical departments for ophthalmology, ENT, dermatology, and cardiology besides standard items like internal medicine, surgery, pediatrics, obstetrics and gynecology, and some of them have a department for clinical laboratory.

Table 2-13, below, shows the size of each base hospital.

Table 2-13 LIST OF BASE HOSPITALS

Name of Hospital	Number of Beds	Number of Doctors
1. Avissawella	385	23
2. Gampaha	391	28
3. Negombo	396	23
4. Watupitiwala	339	22
5. Panadura	379	25
6. Nawalapitiya	306	10
7. Matale	529	12
8. Polonnaruwa	326	23
9. Nuwara-Eliya	189	19
10. Matara	621	64
11. Hambantota	156	9
12. Point-Pedro	216	2
13. Mannar	184	4
14. Vavuniya	142	9
15. Ampara	201	7
16. Kalmune	179	2
17. Trincomalee	290	12
18. Kuliyaipitiya	350	4
19. Nikaweratiya	155	3
20. Chilaw	409	25
21. Kegalle	560	26
Total	6,409	352

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1989

4) District Hospitals

Also, district hospitals are not in the same size with one another, so hospitals of various sizes exist under this category. Some are equipped with 287 hospital beds, and others with only 27 beds. Some big district hospitals have one or two specialized departments and a clinical laboratory department. However, most district hospitals are general medical-care hospitals staffed with one or two doctors and an assistant doctor. There are 120 of such hospitals, and a total of 11,521 beds are placed in those hospitals.

5) Peripheral Units

Peripheral units are hospitals with a ward for general medical care (ward for men, women, or children) or a ward for obstetrics or medical treatment, and they are the medical facilities staffed with only one doctor. There were 96 of such hospitals in 1990. The average number of hospital beds equipped in such a hospital was 44 in 1990, and the largest hospital of this category had 89 beds.

At present, the number of such facilities is 122, and the total number of beds placed in those facilities is 5,126.

6) Rural Hospitals

Rural hospitals are those which provide medical examination and treatment to outpatients and inpatients as do the above mentioned peripheral units but do not have a separate obstetric ward. In those facilities, medical care is offered only by one doctor or by an assistant doctor.

In 1990, the average number of hospital beds in such a facility was 24, and the largest in this category had 74 beds, and the smallest only 9.

There are 109 such facilities, and a total of 2,645 beds are placed in those facilities.

7) Special Hospitals

Special Hospitals conduct the medical care for chronic diseases such as tuberculosis, leprosy, mental disorder, cancer, etc. Those special hospitals are all under the control of the Line Ministry.

There is only one rehabilitation hospital in Sri Lanka. The hospital is equipped with 228 beds and used for treating physically disabled people and patients with an acute or chronic disease. The fever

hospital, one of the special hospitals, is to treat patients with infections diseases, and it has 272 hospital beds. There is a dental hospital with 39 hospital beds in Colombo. In addition to those special hospitals, there are police hospitals, prison hospitals, boys' detention hospitals, etc. Table 2-14 shows the sizes of those special hospitals and other hospitals.

Table 2-14 LIST OF SPECIAL AND OTHER HOSPITALS

Name of Hospital	Number of Hospitals	Number of Beds	Number of Doctors
Mental	3	2,202	31
Tuberculosis	3	995	19
Leprosy	2	243	4
Police	N. A	N. A	1
Prison	2	N. A	2
Fever	1	272	5
Young offenders	N. A	N. A	N. A
Cancer	1	462	46
Rehabilitation	1	240	3

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1989

8) Maternity Homes

Maternity homes are used for hospitalizing patients requiring obstetric care, and the facilities are attended by one midwife. Those facilities are also used by rural doctors for examining and treating mothers and children. There are only two maternity homes that have more than eight hospital beds.

The total number of such facilities is five, and the total number of beds placed in those facilities is 31.

9) Central Dispensaries

Central dispensaries are the smallest unit of medical-care facilities. Those dispensaries are only for outpatients, so they do not have any facilities for hospitalization. Patients are consulted only with small treatment by one assistant doctor at those facilities.

There were 361 such facilities in 1989.

(2) Agency for Hygienic Services under the Ministry of Health and Women's affairs

The major functions of Agency for Hygienic Services are the promotion of good health and the prevention of disease.

Those hygienic services are performed by health groups organized at 129 locations throughout the country, and those groups are supported by doctors of local governments.

Prevention programs include infection control, public hygiene, health and hygiene at school, infectious disease investigation, health and hygiene at home, food inspection, etc. Special programs against tuberculosis, malaria, filariasis, leprosy, venereal disease, etc. are carried out by another agency organized by the health-care administrator and his staff.

2-2-5 Medical Personnel

Table 2-15 shows changes in the number of medical personnel in Sri Lanka. According to the data in the table, there has been an approx. 20% increase in the number of medical officers in the last 10 years. This increase has not been steady, and it has experienced a few ups and downs. Especially, from 1989 to 1990, the number of personnel engaged in every type of medical work declined because of students' political movements at educational facilities, which disrupted the development of new personnel. In 1990, there were 15.5 doctors per 100,000 people, i.e., 6,452 people for each doctor. It clearly shows a severe shortage of doctors.

According to the population per one doctor in 1984 shown in the aforesaid table 2-2, the number of Sri Lanka is twice as high as those of Pakistan and of India. The number of nurses in 1990 is 6.8 nurses per 10,000 people, in other words, 1,751 people per one nurse, which shows the shortage as well as the number of doctors. Appendices fig.11-2 and fig.11-5 shows that doctors and nurses are concentrated in the urban area or the nearby districts of the city such as Colombo, Kandy, Gampaha and Gall districts and the number of doctors and nurses are lower than the average number against population.

Table 2-15 HEALTH PERSONNEL, 1980 - 1990, () : Rate per 100,000 population

Year	1980	1982	1984	1986	1988	1989	1990*
Medical Officers	2,055 (13.9)	2,035 (13.4)	1,951 (12.5)	2,217 (13.7)	2,316 (14.0)	2,456 (14.6)	2,440 (15.5)
Dental Surgeons	218 (1.5)	275 (1.8)	288 (1.8)	318 (2.0)	355 (2.1)	333 (2.0)	317 (2.0)
Registered/ Assistant Medical Officers	1,018 (6.9)	911 (6.0)	984 (6.3)	1,047 (6.5)	1,100 (6.6)	1,193 (7.1)	1,074 (6.8)
Nurses	6,123 (41.5)	6,931 (45.6)	7,400 (47.4)	8,019 (49.7)	8,317 (50.1)	9,486 (56.4)	8,957 (57.1)
Public Health Nurses	213 (1.4)	241 (1.6)	209 (1.3)	189 (1.2)	154 (0.9)	146 (0.9)	140 (0.9)
Public Health Inspectors	913 (6.2)	962 (6.3)	916 (5.9)	966 (6.0)	977 (5.9)	943 (5.6)	886 (5.6)
Public Health Midwives	1,817 (12.3)	2,296 (15.1)	3,001 (19.2)	3,102 (19.2)	3,204 (19.3)	3,389 (20.2)	3,321 (21.2)
Hospital Midwives	1,533 (10.4)	1,512 (9.9)	1,538 (9.9)	1,463 (9.1)	1,531 (9.2)	1,641 (9.8)	1,638 (10.4)

* Excludes the Northern and the Eastern Provinces

- (1) Includes Medical Officers in Curative, Administrative and Preventive Services
- (2) Includes Regional and Consultant Dental Surgeons
- (3) Excludes Pupil Nurses

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

Table 2-16 is a record of the numbers of medical personnel graduating from educational facilities for medicine. According to the record, 468 doctors were educated in 1990. If this pace is kept steadily, then there will be an annual increase of about 20% in the number of doctors. In reality, however, the number of doctors is not increasing as expected because some doctors set up practice abroad.

Table 2-16 HEALTH MANPOWER TRAINING, 1988-1990

Category	Duration of Training	Training Institution	Annual Intake			Annual Output		
			1988	1989	1990	1988	1989	1990
Doctors	5 yrs.	Medical Faculty: Colombo	172	168	179	0	0	240
		Peradeniya	0	120	241	0	0	69
		Jaffna	92	95	93	20	61	66
		Ruhuna	0	0	219	0	0	93
Dental Surgeons	5 yrs.	Faculty of Dental Services, Peradeniya	75	75	75	0	0	30
		Medical Faculty: Colombo	35	35	37	18	0	50
Assistant Medical Officers	3 yrs.	Peradeniya	40	40	0	24	0	29
		Jaffna	0	0	0	0	21	19
		NIHS, Kalutara	71	0	23	26	64	66
Nurses	3 yrs.	Nurses Training School: Colombo	326	332	162	141	140	177
		Kandy	325	152	176	90	146	155
		Galle	243	148	154	154	129	212
		Ratnapura	165	50	63	65	40	64
		Kurunegala	228	87	118	131	85	127
		Anuradhapura	191	79	120	42	47	55
		Jaffna	59	147	0	89	36	0
		Batticaloa	94	56	28	21	39	14
		Badulla	206	111	110	164	52	109
		Kadana	0	173	86	0	0	0
		Pharmacists	2 yrs.	Medical Faculty, Colombo	78	74	0	0
Phisio-therapists	2 yrs.	NIHS, Kalutara	33	35	0	0	31	35
		School of Physiotherapy, Colombo	22	23	0	3	18	16
Occupational Therapists	2 yrs.	- do -	7	8	0	2	8	3
Radiograhpers	2 yrs.	School of Radiography, GH Colombo	27	27	0	5	24	19
		Medical Research Istitute	39	43	0	1	90	47
Medical Laboratory Technologists	2 yrs.	NIHS, Kalutara	30	29	0	0	0	29
		NIHS, Kalutara	0	19	17	0	0	0
Public Health Nursing Sisters	1 yr.	NIHS, Kalutara	0	19	17	0	0	0
Public Health Inspectors	1 yr.	NIHS, Kalutara	71	68	0	67	67	136
Dental Therapists	2 yrs.	Dental Nurses Training School, Maharagama	24	23	22	0	18	22
Family Health Workers	1 yr.	Nurses Training School: Colombo	172	174	133	107	174	172
		Kandy	162	222	97	0	129	214
		Galle	213	282	109	0	196	243
		Ratnapura	86	96	45	0	78	81
		Kurunegala	186	196	37	20	83	99
		Anuradhapura	118	102	20	0	114	0
		Jaffna	55	77	0	0	0	0
		Batticaloa	64	51	0	0	63	7
		Badulla	124	124	54	77	115	118

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

Table 2-17 shows educational courses available to graduates, degrees to be acquired, and the number of people completed each course in 1990.

Depending upon which degree to be acquired, one or two years of work-experience after the completion of the course is required for acquiring a particular degree.

Table 2-17 COURSES CONDUCTED BY THE POST-GRADUATE INSTITUTE OF MEDICINE - 1990

Course	Degree	Duration	Output	Board certificate issued after
Family Medicine	Dip.	1 yr.	36	0
	M. D.	1 yr.	0	2 yrs.
Community Medicine	M. Sc	1 yr.	13	0
	M. D.	2 yrs.	3	2 yrs.
Health Education	M. Sc	1.5 yrs.	0	0
Surgery	M. S.	2.5 yrs.	7	2 yrs.
Obstetric & Gynaecology	M. S.	2.5 yrs.	11	"
Ophthalmology	M. S.	2.5 yrs.	3	"
	Dip.	1 yr.	14	0
Dental Surgery	M. S.	2 yrs.	4	2 yrs.
General Medicine	M. D.	2.5 yrs.	10	"
Paediatrics	M. D.	2.5 yrs.	8	"
Radiotherapy & Oncology	M. D.	3 yrs.	2	"
Anaesthesiology	M. D.	2.5 yrs.	5	"
Radiology	M. D.	3 yrs.	6	"
Psychiatry	M. D.	3 yrs.	2	"
Pathology	Dip.	1 yr.	4	0
	M. D.	2 yrs.	2	1 yr.
Forensic Medicine	Dip.	1 yr.	2	"
	M. D.	2 yrs.	0	"
Microbiology *	Dip.	1.5 yrs.	0	0
	M. D.	2 yrs.	0	1 yr.
Otolaryngology *	M. S.	2.5 yrs.	0	2 yrs.
Child Health	Dip.	1 yr.	32	0
General Dental Practice	Dip.	1 yr.	13	0
T. B. and Chest Diseases	Dip.	1 yr.	0	0
Orthodontics	M. S.	2 yrs.	2	2 yrs.

* No examination held during the year

Source : ANNUAL HEALTH BULLETIN SRI LANKA 1990

2-3 Development Plans

2-3-1 National Development Plans

National development plans are composed at each ministry. The Line Ministry carries out the following items as its duties, which are also listed in the constitution of the Republic of Sri Lanka. The Line Ministry composes development plans in accordance with the following.

- (1) The living standard of the people and their families is to be raised to a higher level. Specifically, the people are to be well fed, well clothed, and well housed. The people are to enjoy leisure, society, and culture, and continuous improvement is to be made for better living circumstances.
- (2) The state is to pay special attention to promote physical, spiritual, ethical, religious, and social learning for children and young men and women and to protect them from exploitation.
- (3) The state is to protect and improve the environment in consideration of the interests of the whole society.

The government is to provide the people with free health-and-medical care in their vicinity, the health and medical care offered being comprehensive, promotive, preventive, and curative to keep every citizen as a member of society.

2-3-2 Development Plans for Health and Medical Care

(1) Policies on Health and Medical Care

The Ministry of Health has composed annual "Health Development Plans" since 1985, and the current plan for 1992 is the eighth of such plans. Those annual plans have improved the management of the system which provides health and medical care in Sri Lanka. The following is the outline of the plan for 1992.

The government promises to facilitate the comprehensive prevention of infections and treatment of diseases so that health and medical care which enables the restoration of patients as members of society will be provided to the people free of charge in their vicinity. The government places priority on the following points.

- 1) Inter-adjustment should be made among the facilities of the health and medical sector, and its related sectors should be vitalized through a national health-improvement network.
- 2) Health improvement is essential to the development of the state, society, and economy. Therefore, consideration of health and medical care should be included in every major programs carried out by the government.
- 3) Differences in quality should be rectified in the health and medical care offered in each district and also among the districts.
- 4) The Line Ministry, which holds the leadership for central administration in health and medical care, should be strengthened so that the ministry can plan, arrange, monitor, and appraise health-and-medical care activities carried out throughout the country.

(2) Lines for Policy Implementation

In accordance with the above mentioned policies, the government has conceived of the following lines for policy implementation.

- 1) A primary health care network should be established throughout the country. This network should carry out the prevention of infections and the improvement of environmental hygiene and to promote the public participation in the programs and services offered for those purposes.
- 2) Faults in the current personnel arrangement should be corrected through establishing a new personnel arrangement and providing training in order to efficiently utilize the current facilities and staff.
- 3) Children's vaccination program against six types of infections should

- be implemented to achieve 100% participation, and efforts should be continuously made to keep the perfect participation.
- 4) Malaria control should be effectively carried out.
 - 5) Upon defining general hospitals as the highest level of facilities to provide medical care basing on Guramodaya Health Center as the standard, the maintenance of the existing facilities for health and medical care should be efficiently carried out.
 - 6) Medical personnel working outside the public sector should be employed for meeting the public demands.
 - 7) Medical facilities as well as health administration should be strengthened to protect the people from foods, drinks, and poisons which may damage the people's health and welfare.
 - 8) By preserving and also revitalizing traditional techniques and methods of treatment, traditional medicines should be rediscovered and promoted. By doing so, the levels of the specialists engaged in traditional medicines should be improved. Ayurvedic(traditional treatment) dispensaries are to be established in Puradeshiya Sabha area, and this institution should be given a prerogative to make re-researches for traditional medicines in order to develop a nation-wide plantation of medicinal herbs.
 - 9) Some part of the authority of the central government should be transferred to the provincial parliaments so that systems for health and medical care at provincial level will be established. Also, the administration carried out by the regional directors of health services should be excluded from the administration of the central government.
 - 10) Effective, general medical-care and preventive health care should be provided at peripheral level.
 - 11) A network of high-level facilities for health and medical care should be provided for referral service of secondary and tertiary care. Some of those facilities should be also rearranged to function as a public training center which provides medical specialists, technicians, and assistants with training at various levels and in various fields.
 - 12) The function that has conventionally carried out special medical-campaigns with initiative from the central government should be transferred to and managed by the provincial governments. Those special campaigns should be in relation with a total program that includes the prevention of infections and the provision of medical care and that deals with major problems of controlling and wiping out malaria, tuberculosis, leprosy, venereal disease, filariasis, rabies, etc.

- 13) A network of clinical examination service should be established so as to assist clinical examinations for general medical care or researches carried out in each district.
- 14) Health education should be improved to disseminate the knowledge of basic medical care to the public. The public participation should be promoted in planning a program for health and medical care as well as in implementing it.
- 15) Health and medical projects with a high priority should be implemented and promoted through receiving technical and economic cooperation from foreign agencies or other agencies, which may offer multi-national or bilateral assistance.
- 16) Personnel should be developed more efficiently and effectively by improving the facilities of the national training centers and also by training the staff working at those facilities. Furthermore, training should be provided to those working at each of the specialized positions that are categorized in eleven levels of health and medical services.
- 17) Researches should be promoted in the field of health and medical care as well as in its related field in order to facilitate the improvement of the health and medical care provided at national and provincial levels.
- 18) Programs should be monitored and evaluated. For modifying and rectifying current programs or planning a new program, the current condition of health and medical care should be studied periodically to review the programs.
- 19) The whole system of health and medical care should be improved.

Provincial directors of health services care have planned the lines for policy implementation in accordance with the policy that the administrative authority for health and medical care should be transferred from the central government to the provincial governments and also in view of achieving the goal, "Health for All by the Year 2,000." Divisional level information has been collected and District plans have been materialized to compose provincial development plans for health and medical care within the frame of the goals of the national development. Upon analyzing those provincial Health Development Plans together with Plans composed by the directors of teaching hospitals, the National Health Development Plan has been instituted.

The purposes and goals of the National Health Development Plan are listed in Table 2-18.

TABLE 2-18 THE PURPOSES AND GOALS OF THE NATIONAL HEALTH DEVELOPMENT

INDICATOR	BENCH MARK	TARGET	
		1995	2000
Health Status Indicators			
1. Infant Mortality Rate	37.7	18	15
2. Neo-natal Mortality Rate	24.2 (1979)	11	7.5
3. Maternal Mortality Rate	0.8	0.4	0.3
4. Life Expectancy at Birth	68	68	69.5 (M)
5. Percentage of new borns having less birth weight than 2500 gms.	27.6	20	18
6. Crude Birth Rate	27.6 (1980)	18	16

INDICATOR	BENCH MARK	TARGET	
		1995	2000
Health Care Provision			
Indicators Coverage Infants			
7. Coverage BCG 1 dose	58.4 %	100 %	100 %
DPT 3 doses	45.7 %	100 %	100 %
OPV 3 doses	45.7 %	100 %	100 %
8. Eradication of neo-natal tetanus	5/100,000 births	0/100,000 births	
9. Tetanus Toxoid 2 doses	48.5 %	70.0 %	75 %
10. Proportion of Infants covered through MCH clinics	80.0 %	82.0 %	95 %
11. % of total deliveries in institution	N. A	84	88
12. Proportion of population to which drinking water is available at home or immediate vicinity	(1980)		
Rural	30 %	40 %	100 %
Urban	72 %	75 %	100 %
13. Number of eligible couples using a contraceptive methods	N. A	67 %	72 %
14. Number of eligible couples using modern contraceptive methods	N. A	49 %	57 %

Source : NATIONAL HEALTH DEVELOPMENT PLAN 1992

2-3-3 Transition of Foreign Aid

The following are the outlines of projects carried out by the United State Agency for International Development (USAID) and the Finnish International Development Agency (FINNIDA), both of which are major contributors to the Republic of Sri Lanka.

(1) Aid Projects Cooperated by the U.S.A. through USAID

The United States ended its assistance in the field of health and medical care in Sri Lanka in 1987, and its assistance is now directed to the social and economic field, for example, improving employment in the medium and small businesses.

1) Malaria Control Project

This project was aimed at controlling malaria and at the same time strengthening and encouraging the government of Sri Lanka to carry out the malaria control project continuously by itself. The project started in 1978 and ended in 1984. The funds supplied was US\$ 28.2 million.

The gist of the project was to support a malaria control project that would keep the rate of malarial infection below one infected person per 1,000 people a year throughout the country for as many years as possible.

The following were the activities implemented in the project.

- a. Focussed spraying of insecticide.
- b. Selective spraying of insecticide after studying infection pattern
- c. Step-by-step study of general health-and-medical care.

2) Preventive Health and Medical Care

The goal of this project was to extend the service area and to improve the quality of preventive health and medical care at village level.

The problem that commands immediate attention in the health and medical care of Sri Lanka is that there are villages which completely lack or are short of not only health and medical care but also hygienic drinking water.

USAID offered technical assistance through training to improve the health and medical care in those villages. It also provided funds for a

project that secured drinking water and environmental hygiene as well as funds for an comprehensive school health project.

The total funds supplied was US\$ 42.5 thousand, and the project was carried out in 1984.

3) Construction of Water Supply Facilities to Market towns

The goal of this project was to improve the quality, use, and reliability of drinking water for the people living in the region of Jaffna Peninsula. The outline of the project is as follows.

- a. A master plan was composed to develop a water source in the peninsula, to maintain the source so developed, and to improve the hygienic condition of the water.
- b. The water supply facilities were improved at two market towns, Point Pedro and Chavakachicheri.
- c. Skills of the National Water Supply and Drainage Board for designing, constructing, and maintaining water supply facilities were improved. A total of US\$ 8.0 million was provided, and the project was carried out from 1980 to 1984.

(2) Finland

The Finnish International Development Agency (FINNIDA) assists economic, social, and environmental improvement in a specific area, as seen in Kalutara District. The following are the outlines of some projects carried out in the past and of the project currently being carried out.

1) Kalutara District Integrated Development Project, Phase I (1987 - 1990) and Phase II (1991 - 1993)

a. Economic Infrastructure Improvement

Construction of roads and bridges, improvement of the facilities for flood prevention and for irrigation, construction of power-supply facilities, installation of telephone lines, etc.

b. Social Infrastructure Improvement

Improvement of the educational facilities, Improvement of the facilities for primary health and medical care such as peripheral and rural hospitals, construction of water-supply facilities, construc-

tion of housing units, improving villages' living standard, etc.

c. Environmental Improvement

Tree planting, soil preservation, and land cultivation

d. Employment and Income Creation

Industrial revitalization and employment creation, agricultural development, newly-opened-land assistance, etc.

2-3-4 Transition of the Assistance from the Japanese Government

Japan has been actively carrying out aid programs as a major member of the Conference of Assisting Nations for Sri Lanka. The amount of foreign aid received from Japan now accounts for as much as that coming from the United States or the United Kingdom in the total aid received by Sri Lanka. The Japanese loan started in 1966 and grant aid started in 1969.

In the field of health and medical care, there have been eight projects cooperated by Japan in technical assistance, and there are two projects currently being carried out (Expansion Project for the National Medical Research Center and Population Information Project). In those projects, construction of facilities, technical assistance by experts dispatched from Japan, and procurement of medicines, chemical reagents, and medical equipment have been carried out. Moreover, improvement of medical equipment has been carried out in the Project Phase I, etc., and construction of peripheral facilities has been carried out in the Project for Construction of Storage for Medicine and Medical materials, etc.

Each project carried out by Japanese assistance has covered the whole country and has been systematically carried out for a long period. Those are the characteristics of the assistance offered by the Japanese government. Table 2-19 shows the record of the projects carried out recently.

Table 2-19 RECORD OF JAPANESE ASSISTANCE TO SRI-LANKA IN HEALTH SECTOR

(1/2)

PROJECT TITLE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
1 Teaching Hospital Peradeniya (Peradeniya) -For developing doctors in the fields of obstetrics and gynecology and pediatrics. Assistance period: Feb. 29, 1980 - Feb. 28, 1984	P/S	D/I		M/S		R/E									
		(1)	59 Expert.	1	13										
2 Construction Project of Sri Jayawardanapura General Hospital (Colombo's suburb in Kotte District) -For constructing a general hospital having wards with 1,000 hospital beds, an outpatient department, a central examination and treatment section, and a management and service ward in the new capital city, Sri Jayawardanapura (total assistance 8.2 billion yen). There was a project-type technical Cooperation to offer training for how to use clinical and medical equipment Assistance period: Apr. 18, 1986 - Apr. 17, 1990			(GGA)	(GGA)	(GGA)	(GGA)									
			300 E/N	3,200 E/N	3,500 E/N	1,500 E/N									
3 Hygienic Improvement Project -For providing equipment to effectively spray insecticide for malaria control and providing medical equipment for treating patients affected with malaria. (equipment and materials) pressurized sprayers, insecticides, medicines, etc.															
4 Microfilm-Audiovisual Equipment to the Medical Research Center for Epidemiology (Colombo)															
5 Construction Project of the Essential-Medical and Medical-Reagent Center -For constructing a center that produces medicines essential for the medical care of the people.															
6 Project for Development of Rural Hospitals (Phase I) -For Providing medical equipment to improve the functions of ten hospitals at regional level and at district level.															

GA Grant Aid PTC Project-type Technical Cooperation

(GGA) ; General Grant Aid P/S ; Preliminary Study D/D ; Detail Design
 (CGA) ; Cultural Grant Aid D/I ; Discussions of Implementation R/E ; Repair of Equipment
 E/N ; Exchange of Notes M/S ; Meeting of Schedule B/D ; Basic Design
 L/A ; Loan Agreement

Shows Provision of Equipment and sending period for expert
 () Shows number of expert each year

Table 2-19 RECORD OF JAPANESE ASSISTANCE TO SRI-LANKA IN HEALTH SECTOR

(2/2)

PROJECT TITLE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	
7 Construction Project of Storage for Medicine and Medical Materials (Colombo) -For constructing a new storage to unify the three existing storehouses of medicines, which are separately located in the city, so that inventory management becomes easy.									(GGA) GA 1,343 E/N 88.12.27							
8 Family Planning (Colombo and Kandy) -For promoting the idea and practice of family planning. Assistance period: Nov. 30, 1987 - Nov. 29, 1990					P/S	P/S	P.T.C		P.T.C P/S R/S							
9 Expansion Project for National Medical Research Center (Colombo) -for constructing a modern research facility, an educational facility for training laboratory technicians, a facility for vaccine production, and a facility for keeping animals. The project also provides technical assistance to improve the research quality.									P.T.C P/S P/S (GEN) GA 1,038 E/N 88.1.18							
10 Project for Development of Rural Hospitals (Phase II) -For providing medical equipment to improve the functions of five hospitals at provincial level as well as at district level													P/S		B/D	
11 Project for Rehabilitation of Biomedical Engineering Services (BES)															B/D	(GGA) GA 1,388 E/N
12 Population Information Project									P.T.C P/S				D/I	M/S		

GA Grant Aid PTC Project-type Technical Cooperation

Shows Provision of Equipment and sending period for expert
() Shows number of expert each year

(GGA) : General Grant Aid P/S : Preliminary Study D/D : Detail Design
(CGA) : Cultural Grant Aid D/I : Discussions of Implementation R/E : Repair of Equipment
E/N : Exchange of Notes M/S : Meeting of Schedule B/D : Basic Design
L/A : Loan Agreement

2-4 State of the Hospitals Requested

2-4-1 Outline of the Hospitals

(1) Teaching Hospital, Peradeniya

Teaching Hospital, Peradeniya opened as a general hospital with 447 hospital beds in 1980 by the Japanese government's grant aid assistance. It plays an important role as the teaching hospital for the School of Medicine, Peradeniya University, as well as a medical facility for providing tertiary care in Central Province (with Kandy District, Matale District, and Nuwara Eliya District).

It has clinical departments of internal medicine, surgery, pediatrics, obstetrics and gynecology, psychiatry, etc. The average number of patients visiting the hospital each day is 511. The hospital has an ICU, an NICU, an emergency ward, and a psychiatric ward besides general wards for inpatient accommodation. The total number of staffers is 566: doctors 77, nurses 168, laboratory technicians 12, radiologists 5, and others. In

those doctors, included are specialists for cardiovascular system, renal system, radiology, etc. The annual budget of the hospital in 1991 was 43.19 million Rs. (133.89 million yen). This budget accounts for 760 thousand Rs. (230 thousand yen) per bed, which amount is more than the average of those of other hospitals included in

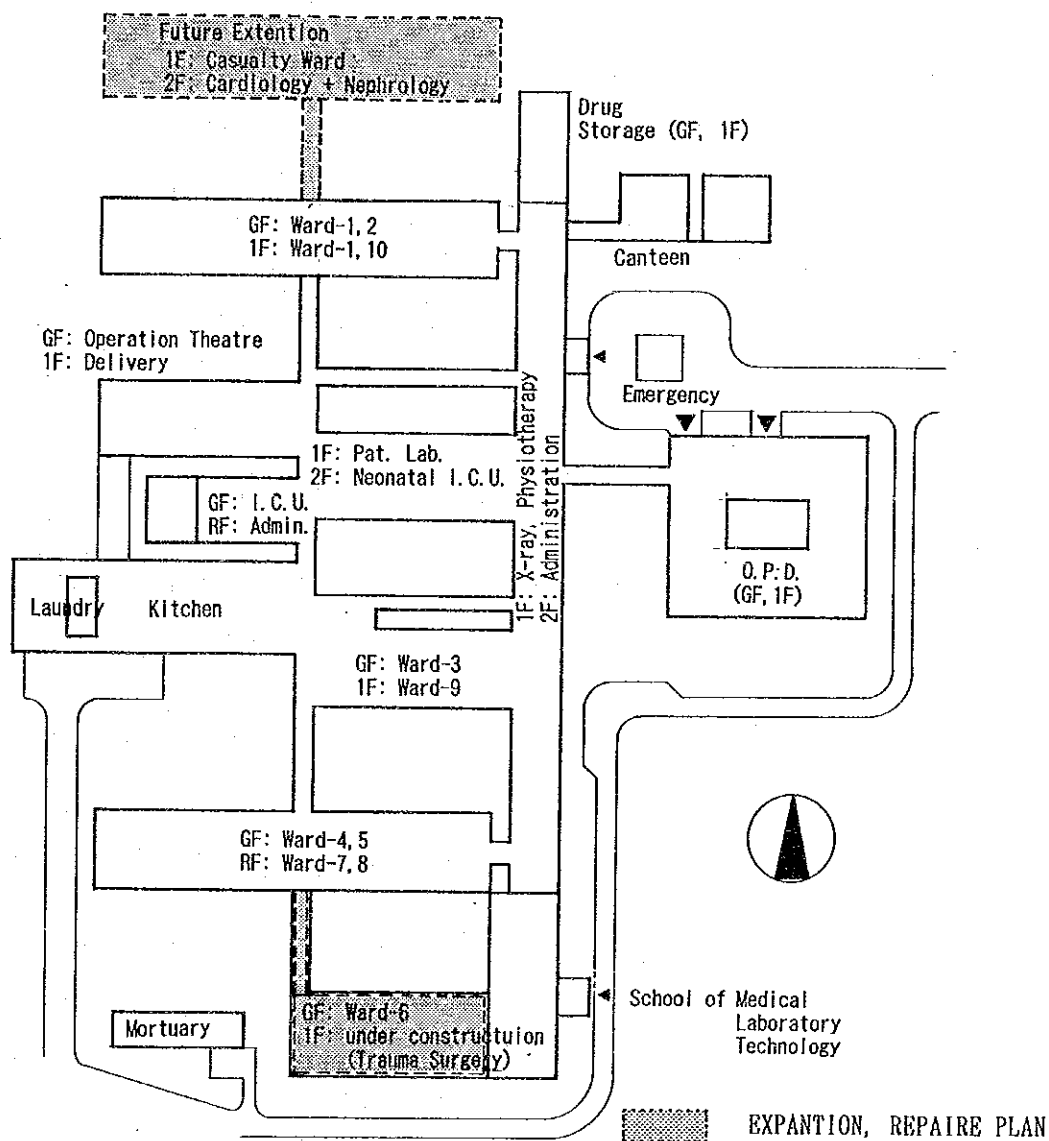
Table 2-20 HOSPITAL BUDGET 1991

ITEM	Rs.
1. Wages	20,145,000
2. Traveling Expenses	60,000
3. Supplies & Requisites	16,757,000
4. Repair & Maintenance	1,100,000
5. Transportation, Communication & other services	5,128,000
TOTAL	43,190,000
Cost per one patient bed	76,000

this project. The expenses for repair and maintenance accounts for 2.5% of the total budget, which is equivalent to other hospitals. This 2.5% for the expenses for repair and maintenance is, however, allocated for the maintenance of building facilities and does not include medical equipment. During the last twelve years since the opening of the hospital, an ICU ward, a facility for training laboratory technicians, a storage facility for medicines and materials, and a psychiatric ward have been added to the hospital. The number of hospital beds has also increased by more than 120, from 447 to 570.

Furthermore, a ward for an emergency cardiovascular-and-renal center is planned to be added in the five-year project from 1992 to 1996 to improve the hospital. The expansion of the hospital's functions is being steadily carried out (refer to Fig.2-4).

As for the medical equipment, the hospital has the most advanced equipment among the five hospitals requested in this project except the X-ray equipment. However, the equipment installed at the opening of the hospital has been used for more than twelve years and worn out. It is about time that the equipment were replaced.



Hospital Level	Type of Medical Care	Total of Beds	No. of Personnel	Diagnostic Dept. (No. of Beds)
Provincial Hospital	Secondary, Tertiary Care	588	588	Medicine(165), Surgery(156) Paediatrics(93), Obstetric(112) ENT(48), Other(11)

Fig. 2-4 TEACHING HOSPITAL, PERADENIYA SITE PLAN

(2) Provincial Hospital, Kalutara

Provincial Hospital, Kalutara belongs to the National Institute of Health Sciences, which is under the direct control of the Line Ministry. The deputy director of the institute is the director of the hospital. This hospital is the only general hospital in Kalutara District. The hospital was moved from the city center to the current site in 1951. As the hospital functions as a referral hospital, some patients are referred to the hospital even from Galle District and Ratnapura District.

It has seven clinical departments: internal medicine, surgery, pediatrics, obstetrics and gynecology, otorhinology, physiotherapy, ophthalmology, dentistry. The average number of patients visiting the hospital is 535 per day. The hospital has 588 beds in 23 wards including an ICU, etc. The total number of staff is 625: doctors 52, interns 17, nurses 190, paramedics 75, and others.

The annual budget of the hospital in 1991 was 40.62 million Rs.. This budget accounts for 690 thousand Rs. per bed, which amount is the second largest after Teaching Hospital, Peradeniya among the five hospitals covered in this project.

Because of the large staff assigned to the hospital,

58% of the total budget is

spent for salaries. On the other hand, the expenses for repair and maintenance accounts for 0.2% of the total budget, which is extremely small in comparison to those spent by other hospitals.

As for its facilities, an ICU ward, a premature baby unit (PBU), and a gynecology ward have been already added to the hospital. Currently, expansion is being planned for adding a ward for a new central-sterilization and material-supply department, an outpatient ward, and a new anatomy ward. This new anatomy ward is almost completed (refer to Fig.2-5).

As for the medical equipment and other installations, they are equipped and maintained so as to meet the functions of a provincial hospital.

However, the outpatient department and emergency department have only low-level equipment, so the improvement of the equipment installed in those departments is an immediate problem to be solved.

Table 2-21 HOSPITAL BUDGET 1991

ITEM	Rs.
1. Wages	23,524,000
2. Traveling Expenses	115,000
3. Supplies & Requisites	12,886,000
4. Repair & Maintenance	70,000
5. Transportation, Communication & others	4,030,300
TOTAL	40,625,000
Cost per one patient bed	69,000

(3) Base Hospital, Nuwara Eliya

Base Hospital, Nuwara Eliya was established by an English philanthropist, Mrs. Baker, as an ophthalmological hospital in 1892. Over the last 100 years after the establishment, the hospital has been expanded numerously. Now, the hospital has come to function as a medium class hospital in Nuwara Eliya District. It has 202 hospital beds, and the average number of patients visiting the hospital is 493 per day. However, the hospital is too small to meet the demands of the area. There are too many patients coming in for the hospital to take care of, so patients are literally overflowing at the outpatient department and in the inpatient ward. The utilization rate of hospital beds is currently at 143%, i.e., two or three patients are placed in one bed. The hospital deals in internal medicine, surgery, pediatrics, obstetrics and gynecology, and ophthalmology. The total number of staff is 186: doctors 24, nurses 63, laboratory technicians 4, radiologists 2, and others.

The annual budget of the hospital in 1991 was 19.6 million Rs..

Because the hospital takes care of many outpatients and inpatients notwithstanding its size being medium, there is a large amount of consumption in the medicines and medical materials. Therefore, the expenses for medicines and

Table 2-22 HOSPITAL BUDGET 1991

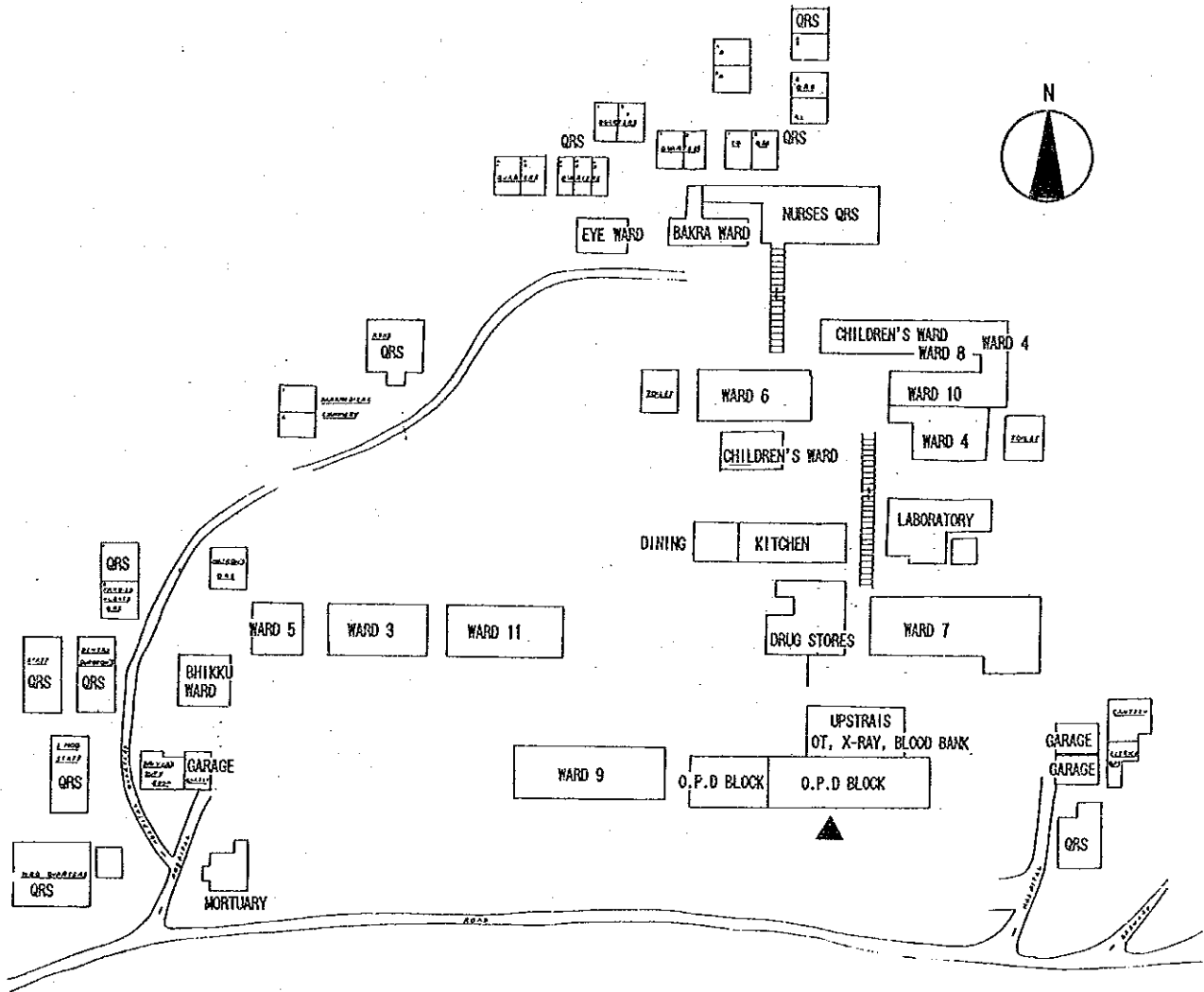
ITEM	Rs.
1. Wages	8,000,000
2. Medicine	10,000,000
3. Procurement of Equipment	1,000,000
4. Maintenance & Repair	500,000
5. Transportation & others	100,000
TOTAL	19,600,000
Cost per one patient bed	97,000

medical materials account for 56% of the total budget. The budget per bed is 970 thousand Rs., which is the largest among the five hospitals covered in this project. Probably, this largest budget per bed is caused from the above mentioned large expenses for medicines and medical materials.

The hospital is located on a high land 1,800 meters above sea level, and it is built on the slope of a mountainside facing the south. The oldest building of the hospital is Baker Ward (ward for ophthalmology), which was built 100 years ago. Through the expansion of the hospital that has been carried out since, the hospital attained the present countenance. Next to Baker Ward, a new ophthalmology ward (including an ophthalmological operation room and twelve beds) has been built (Fig.2-6).

Those facilities of the hospital are being repaired and maintained with fund contributions coming from local groups and private companies. From such contributions, an ICU unit with two beds has been recently completed at a corner of the outpatient department.

The medical equipment is equipped and maintained relatively well through government procurement and aid from Finland.



Hospital Level	Type of Medical Care	Total of Beds	No. of Personnel	Diagnostic Dept. (No. of Beds)
Base Hospital	Secondary Care	202	186	Medicine(54), Surgery(45) Paediatrics(43), Obstetric(40) Ophthalmology(20) Emergency

Fig. 2-6 BASE HOSPITAL, NUWARA ELIYA SITE PLAN

(4) Base Hospital, Gampaha

Gampaha District, Western Province, is the second densely populated area next to Colombo in Sri Lanka.

Base Hospital Gampaha was established in 1920. Since then, the hospital has expanded to include more wards and an administrative unit. Last fiscal year, an ICU unit with six beds was newly opened.

Medical examinations and treatments by specialists started at the hospital in 1978, and now specialists are stationed at each of the departments of internal medicine, surgery, pediatrics, obstetrics and gynecology.

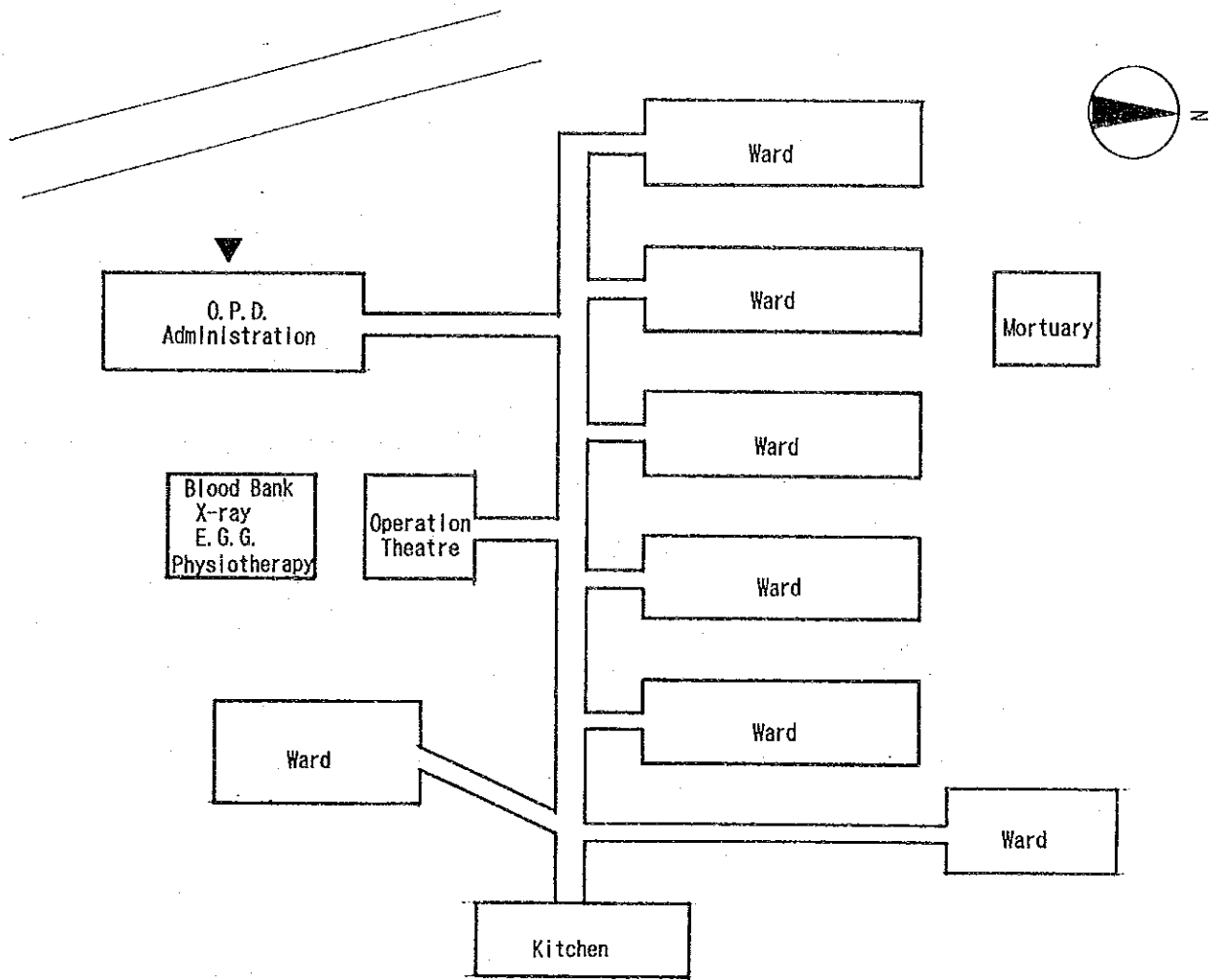
The hospital deals in internal medicine, surgery, pediatrics, obstetrics and gynecology, and ophthalmology, otorhinology, dermatology, dentistry, and physiotherapy. The average number of patients visiting the hospital is 507 per day. The hospital has 366 beds in nine wards including an ICU unit for inpatient accommodation. The total number of staffers is 417: doctors 38, nurses 177, examination technicians 7, radiologists 2, and others.

Table 2-23 HOSPITAL BUDGET 1991

ITEM	Rs.
1. Wages	14,827,273
2. Medicine	5,458,169
3. Procurement & Maintenance	505,050
4. Electricity & Water	515,639
5. Transportation & others	100,000
TOTAL	21,306,131
Cost per one patient bed	58,000

The annual budget of the hospital in 1991 was 21.30 million rupees, and the budget per bed is 580 thousand rupees, which amount is relatively small.

At present, there is no plan to expand the facilities of the hospital (Fig.2-7). Most of the medical equipment is worn out, and there is no respirator or ventilator. In this respect, the hospital is at the lowest level in the state of medical equipment among the base hospitals of its size.



Hospital Level	Type of Medical Care	Total of Beds	No. of Personnel	Diagnostic Dept. (No. of Beds)
Base Hospital	Secondary	366	204	Medicine(95), Surgery(94) Paediatrics(62), Obstetric(85) Eye(20), ENT, Dermatology, Dental, Psychiatry

Fig. 2-7 BASE HOSPITAL, GANPAHA SITE PLAN

(5) Base Hospital, Hambantota

Hambantota Base Hospital was established as a district hospital about 50 years ago. In 1984, the hospital was promoted to a base hospital to provide the people living in Hambantota District and neighboring districts with more specialized medical care. At that time, physicians, pediatricians, and ophthalmologists were assigned to start specialized services.

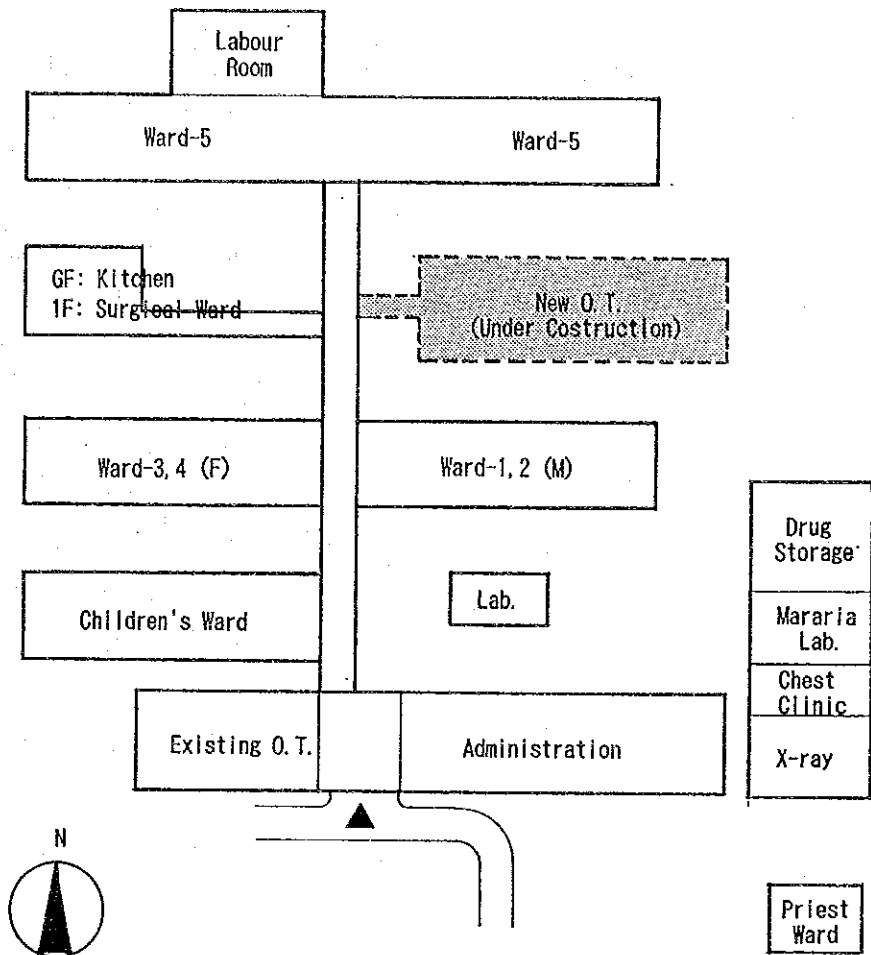
The hospital deals in internal medicine, surgery, pediatrics, obstetrics, ophthalmology, dentistry, etc. The average number of patients visiting the hospital is 326 per day. The hospital has 159 beds for inpatient accommodation, but the hospital lacks such specialized wards as ICU and premature infant unit. The total number of staffers is 57 including nine doctors and 28 nurses. In contrast with Base Hospital, Nuwara Eliya, Base Hospital, Hambantota has a very small staff.

Although this hospital is ranked as base hospital, the hospital lacks equipment to match the other base hospitals. Therefore, services offered at the hospital is almost similar to those provided at a district hospital. Because of this, patients of this district requiring operation or those with severe conditions are not treated in the hospital. Instead, they are sent to Base Hospital Matara, which is located about 80 kilometers away, or to Teaching Hospital, Karapitiya (Teaching Hospital, Galle). In order to provide the hospital with functions of a base hospital, a series of construction projects for facility expansion have been being carried out recently. As a result, the construction of a ward for operation theaters was started in 1991, and it is scheduled to be completed at the beginning of next year. In addition, a surgical ward is also planned to be constructed soon (Fig.2-8).

The hospital budget is Rs. 7.94 million in total i.e, Rs. 50,00/bed and the least among these 5 hospitals included in the Project.

Table 2-24 HOSPITAL BUDGET 1991

ITEM	Rs.
1. Wages	4,121,942
2. Traveling Expenses	50,000
3. Supplies & Requisites	2,814,700
4. Repair & Maintenance	155,000
5. Transportation, Communication & other	805,650
TOTAL	7,947,292
Cost per one patient bed.	50,000



EXPANTION, REPAIRE PLAN

Hospital Level	Type of Medical Care	Total of Beds	No. of Personnel	Diagnostic Dept. (No. of Beds)
Base Hospital	Secondary	189	59	Medicine(86), Paediatrics(31) Obstetric(98) Eye Dental(5)

Fig. 2-8 BASE HOSPITAL, HAMBANTOTA SITE PLAN

2-4-2 State of Medical Treatment

Medical services are vigorously provided at each hospital. It can be seen in the utilization rates of hospital beds listed in the table below. Except Base Hospital, Gampaha the utilization rates at the hospitals are almost 100%. Surprisingly, it is 143% at Base Hospital, Nuwara Eliya. This is an indication that one bed is occupied by two or three patients.

When the number of outpatients visiting each hospital in a year is considered, even Base Hospital, Gampaha, which has a low utilization rate of hospital beds, treats 185,000 people, a large number of patients.

TABLE 2-25 HOSPITAL STATISTICS

Name of Hospital	No. of outpatient	No. of inpatient	Bed occupancy	Av. stay	No. of operation	No. of Clinical Analysis	No. of X-RAY Taken	No. of Delivery
Teaching Hospital, Peradeniya	186,716 (year)	30,390 (year)	84%	6.6	7,737 (year)	94,163 (year)	20,334 (year)	4,216 (year)
Provincial Hospital, Kalutara	40,000 (month) 195,319 (year)	39,016 (year)	100%	5~6	800 (month) 7,537 (year)	58,400 (year)	77 (20000pcs. /year)	500 (month)
Base Hospital, Nuwara Eliya	493 (day) 136,000 (year)	105,850 (year)	143%	—	1,466 (year)	6,885 (month)	593 (month)	1,902 (year)
Base Hospital, Gampaha	185,000 (year)	2,400 (month) 22,657 (year)	68%	2~6	340 (month)	42,369 (month)	5,256 (year)	240 (month)
Base Hospital, Hambantota	9,783 (month) 36,293 (year)	12,919 (year) 10,660 (year)	97,3%	—	Sterili- zation 50 (month)	27,375 (year)	3,094 (year)	840 (year)

Source : Hospital Statistics

2-4-3 Arrangement of the Medical Staff

The table below shows the arrangement of the medical personnel at each of the hospital covered in this project.

Doctors and nurses are staffed relatively well at Teaching Hospital, Peradeniya and Provincial Hospital, Kalutara probably because they are under the direct control of the Line Ministry. On the other hand, Base Hospital, Nuwara Eliya seems to be short of doctors and nurses when the numbers of inpatients and outpatients treated there are taken into consideration. As for Hambantota Base Hospital, even though it is called "Base Hospital," the hospital has not reached the level of the base hospitals yet. The hospital has a small number of clinical departments as well as a small number of doctors.

Table 2-26 ALLOCATION OF MEDICAL PERSONNEL

Name of Hospital		Teaching Hospital Peradeniya	Provincial Hospital Kalutara	Base Hospital Nuwara-Eliya	Base Hospital Gampaha	Base Hospital Hambantota
Doctor	Medicine	10	8	3	5	1
	Surgery	10	10	3	5	—
	Paediatrics	9	6	3	3	1
	Obstetric Gynecology	12	8	3	4	—
	Anesthesiology	13	5	2	3	—
	Ophthalmology	—	3	1	—	1
	Psychiatry	3	—	—	—	—
	Oral Surgery	—	—	1	—	—
	Radiology	1	1	—	—	—
	E. N. T	—	2	—	—	—
	Pathology	6	1	—	1	—
	Blood Bank	2	1	1	1	—
	Emergency	1	3	2	—	—
	O. P. D	10	14	5	16	—
	Other	—	6	—	—	5
Total		77	68	24	38	9
Nurse	Nurse	168	185	55	81	28
	Assistant	—	—	8	14	—
Total		168	185	63	95	28
Paramedical Stuff	Radiographer	5	4	2	2	2
	Laboratory Technician	12	7	4	5	5
	Pharmacist	8	11	4	10	4
	Physiotherapist	2	3	1	2	—
	Maintenance Tech Helper	1	—	—	—	—
	Assistant	—	147	—	72	—
	Other	—	10	—	—	—
Total		38	193	11	91	11
Non Medical Staff		283	284	88	—	9
Grand Total		566	580	186	224	57

Source : Hospital Statistics

2-4-4 Conditions of the Medical Equipment

(1) General Condition

According to the survey conducted by the Line Ministry, it is concluded that our of order is thirty percent or more of the medical equipment which the public hospitals possess all over country. However, the report of the reactivation of the hospital equipment, which was conducted by JICA from April to May, 1992, says that the ratio of equipment in trouble is twenty one percent, which is lower than reported by the Line Ministry and of which forty one percent of equipment is repairable by Sri Lanka side. The following are the hospitals which the hospital equipment reactivation team visited and made rapairs.

- 1) Teaching Hospital, Peradeniya
- 2) Base Hospital, Matara
- 3) Provincial Hospital, Ratnapura
- 4) Base Hospital, Poronnarwa
- 5) Provincial Hospital, Annuradapura
- 6) Provincial Hospital, Kurunegara
- 7) Provincial Hospital, Badura
- 8) Base Hospital, Matale

The situation is almost the same as the five hospital including teaching hospital, Peradeniya included in this Project. Especially, it is remarkable that the troubles are caused by superannuation of the major equipment e.g. X-ray photograph units, High pressure steilizers, Anesthetic machine, Ventilators, Ultrasound diagnostic units. It is found out that troubles are caused by shortage of knowledge about operations and maintenance of equipment. For instance some operators deem out-of-order the equipment of which fuse are melt down, electric plugs are broken and battery cells are discharged. It can be said that such troubles should be solved by education and training about equipment management and maintenance.

(2) Condition of the medical equipment which hospitals possess included in this Project

Table 2-27, below, shows the conditions of existing medical equipment at each hospital covered in this project. The items listed here represent part of all the existing medical equipment but major items used at each hospital.

A. The equipment is being used in good condition without any problems.

B. The equipment is being used but has a problem.

C. The equipment is not used because of encountering some technical trouble, having passed its service life, or having other problems.

Table 2-27 Condition of Equipment in Project Site

(1) Teaching Hospital, Peradeniya

Equipment Name	Q'ty	A	B	C	Condition
【Operation】					
Anesthetic Machine	5	4	1		Japanese made
Anesthetic Ventilator	4	4			
Bowl Sterilizer	36	25	3	8	Damaged heater
Defibrillator	2	2			Japanese made
Electric Surgery Unit	3		3		
Colono scope	1		1		Maintained by local agent
Gastro Fiber Scope	1		1		Maintained by local agent
High Pressure Sterilizer	2	1	1		Japanese made
Mobile Operating Light	3	3			
Operating Room Lamp	3	3			
Pulse Oxymeter	2	1	1		British made
Respiratory Gas Monitor	1			1	
Suction, Double Jar	6	5		1	Japanese made
Suction, Single Jar	6			6	Low pressure, Japanese made
Surgical Diathermy	2		2		
【ICU】					
O ₂ Monitor	1			1	Japanese made

(1) Teaching Hospital, Peradeniya

Equipment Name	Q'ty	A	B	C	Condition
Resuscitator	1		1		Japanese made
Ventilator, Paediatrics	4	1		3	Only old equipment is operating
Ventilator, Adult	1	1			
Infusion Pump	4	1	1	2	Alarm reset is out of order
Central Monitor	5	2	1	2	Japanese made
Patient Monitor	6	3	2	1	Japanese made
[Laboratory]					
Water Bath	1	1			
Incubator	2	2			
Flame Photometer	2	2			2 units French made
Freezing Microtome	2			2	Japanese made
Water Distiller	3	1		2	S/P not available Distilled water is supplied from university
Colorimeter	3	1	1	1	Overage
Hot Air Sterilizer	8	5		3	
Centrifuge	11	6	2	3	Ten years used
Direct Reading Balance	3			3	
Spectrophotometer	7	2	4	1	Overage
Binocular Microscope	13	11	2		
Laboratory Autoclave	1			1	
Blood Gas Analyzer	1	1			Maintained by doctor, French made
[X-ray]					
Film Dryer	1	1			
Automatic Film Processor	1		1		
X-ray System	2	1		1	12 years old. Flouroscopy is out of order.
Mobile X-ray System	1	1			

(1) Teaching Hospital, Peradeniya

Equipment Name	Q'ty	A	B	C	Condition
【Phsiotherapy】					
Ultrasonic Therapy Unit	1	1			Japanese made
Infrared Lamp	2	2			
Wax Bath	3	1		2	Overage
Microwave therapy Unit	1	1			
Microton-Nerve Stimulator	2	1	1		Japanese made
Short Wave Therapy Unit	1	1			
【O. P. D】					
Ultrasound Scanner	1	1			Japanese made
ECG	2	2			Japanese made
Gamma Camera	1	1			Donation from IAEA
【Obstetric-SBU】					
Delivery & Operating Table	9	7	2		Japanese made
Photo Therapy Unit	1	1			
Vacuume Extractor	1		1		
Infant Warmer	1	1			
Foetal Heart Detector	9		1	8	Damaged probe
Nebulizer	4			4	
Infant Incubator	10	6	4		Japanese made
Infant Monitor	1			1	Japanese made
Neonatal Monitor	3			3	Japanese made
【Blood Bank】					
Blood Bank Refrigerator	1	1			USA made
【Others】					
Mortuary Refrigerator	3	2		1	
Ambulance	3	3			

(2) Provincial Hospital, Kalutara

Equipment Name	Q'ty	A	B	C	Condition
【Operation】					
Anesthetic Machine	5	5			3 units ; 2-3 years old, 2 units ; 5-7 years old
Ventilator	3	3			Japanese made
Bowl Sterilizer	3	2	1		Floor installed, heater not available
Defibrillator	3	2	1		
Electrosurgery Unit	6	5	1		3 different maker. Overaged Lead Electrode
Mobile Operating Lamp	8	7		1	
Operating Room Table	4	4			Overage, manual type
Suction, Double Jar	9	9			
Suction, Single Jar	23	10	9	4	Overage, low press
【ICU】					
Therapeutic Ventilator	1	1			Normal operating. For I.C.U. patient
【Laboratory】					
Water bus	3	1		2	
Incubator	1	1			
Flame Photometer	2	1		1	French made
Water Distiller	3	1		2	Lack of capacity
Hot Air Sterilizer	3	2		1	
Centrifuge	5	3	1	1	20~30 years used
Binocular Microscope	4	4			Japanese made, 3-4 years old
Laboratory Autclave	1			1	1 year used, under repairing
【X-ray】					
X-ray System	3	1	1	1	1 unit : Japanese made, installed one year ago 1 unit : German made, 40 years old
Mobile X-ray System	3	2		1	1 unit old modle, difficulty of transportation
【Phsiotherapy】					
Ultrasonic Therapy Unit	1	1			[all equipments in Rehabilitation Dept. are operated in good condition]

(2) Provincial Hospital, Kalutara

Equipment Name	Q'ty	A	B	C	Condition
Infrared Lamp	2	2			
Wax Bath	1	1			
Ultraviolet Lamp	2	2			
Microton-Nerve Stimulator	1	1			
Shortwave Therapy Unit	1	1			
Muscle Stimulator	2	2			
【O. P. D】					
Ultrasound Scanner	1				1 year used
Slit Lamp	1	1			3~5 years old
ECG	1	1			Japanese made
Pluster Cutter	1	1			
【Obstertric-SBU】					
Photo Therapy Unit	5	3	1	1	Grow Lamp in demaged
Vacuume Extractor	3	3			
Foetal Heart Detector	2	1		1	
Nebulizer	11	11			
Infant Incubator	4	2	1	1	1 unit : Temp. control out or order
【Blood Bank】					
Blood Bank Refrigerator	2	2			Difficulty of temp. control for frequent power failure and trouble of emergency generator
【Others】					
Air Conditioner	3	3			Installed in operation room
Ambulance	2	1	1		1 unit : 1 year old 1 unit : under repalring
Emergency Generator	2		1	1	2 unit : 1.5 KVA and 10KVA

(3) Base Hospital, Nuwara-Eliya

Equipment Name	Q'ty	A	B	C	Condition
【Operation】					
Anesthetic Machine	3	1		2	10 years old
Cryo Machine	1	1			Procured 1 year ago
Defibrillator	1		1		Defibrillator is damaged only ECG monitor is operated
Electric Surgery Unit	2		2		
Gastro Fiberscope	1		1		Japanese made, maintained by local agent
High Pressure Sterilizer	2	2			
Mobile Operating Light	1	1			
Operating Microscope, EYE	1		1		Simple type, overaged
Operating Room Lamp	2	1		1	1 unit: damaged
Suction, Single Jar	4		4		
【Laboratory】					
Water bus	2			2	Mixing motor is damaged
Incubator	4	4			
Flame Photometer	1	1			French made
Water Distiller	1	1			
Electronic Balance	1		1		Overage
Colorimeter	1		1		20 years old
Hot Air Sterilizer	1	1			Japanese made
Centrifuge	4		1	3	20 years old
Binocular Microscope	2	2			
Laboratory Autoclave	1	1			Japanese made
【X-ray】					
Film Dryer	3	1		2	
X-ray System	1	1			Overage
Mobile X-ray System	1	1			

(3) Base Hospital, Nuwara-Eliya

Equipment Name	Q'ty	A	B	C	Condition
【Phsiotherapy】					
Infrared Lamp	1	1			Diagnosis room is not available. New equipment is stored in storage.
Wax Bath	1	1			Diagnosis room is not available. New equipment is stored in storage.
Shortwave Therapy Unit	1	1			Diagnosis room is not available. New equipment is stored in storage.
【O. P. D】					
Ultrasound Scanner	1	1			Japanese made
Slit Lamp	1	1			
ECC	1	1			Japanese made
Weighing Scale	1	1			
【Obstertric-SBU】					
Delivery & Operating Table	4		4		Ordinary patient bed is used as deliverly table
Vacuume Extractor	1	1			
Nebulizer	1	1			
Infant Incubator	4	2	2		2 units: no humidifier. 2 units: donation from local campany.
【Blood Bank】					
Blood Bank Refrigerator	1	1			U. S. made
【Other】					
Ambulance					

(4) Base Hospital, Gampaha

Equipment Name	Q'ty	A	B	C	Condition
【Operation】					
Anesthetic Machine	3	2		1	5~10 years old
Ventilator	2	2			Japanese made
Defibrillator	2	2			
Electric Surgery Unit	3	2		1	20 years old. 1 unit: out of operation
Gastro Fiber Scope	1	1			Japanese made
Mobile Operating Light	5	5			4 lamps type
Operating Room Lamp	3	3			10~20 years used. Manual type
Suction, Double Jar	1	1			
Suction, Single Jar	12	12			
【Laboratory】					
Water bus	1	1			New equipment
Incubator	1			1	Overage
Flame Photometer	1		1		Not using
Water Distiller	1		1		Overage
Electronic Balance	1		1		Result is not stable
Colorimeter	1	1			25 years old
Hot Air Sterilizer	1		1		Temp control is out of order
Centrifuge	3	2		1	1 unit: 25~30 years old.
Binocular Microscope	3	3			
Laboratory Autoclave	1			1	Sterilized by boiled water.
【X-ray】					
X-ray System	1		1		10 years old.
Mobile X-ray System	1	1			25 years old. Overage and damaged frequently
【Phsiotherapy】					
Ultrasonic Therapy Unit	1	1			3~4 years old. Good condition

(4) Base Hospital, Gampaha

Equipment Name	Q'ty	A	B	C	Condition
Infrared Lamp	1	1			3~4 years old. Good condition
Wax Bath	1	1			3~4 years old. Good condition
Microton-Nerve Stimulator	1	1			3~4 years old. Good condition
Shortwave Therapy Unit	1	1			3~4 years old. Good condition
Muscle Stimulator	1	1			3~4 years old. Good condition
【O. P. D】					
Slit Lamp	1	1			
ECG	2	1	1		1 unit: trouble in paper feeding.
Pluster Cutter	1	1			
【Obstetri-SBU】					
Photo Therapy Unit	1	1			
Foetal Heart Detector	1	1			
Nebulizer	4	4			
Infant Incubator	3		2	1	8 years old. out of order frequently
【Blood Bank】					
Blood Bank Refrigerator	1				20 years old. Temp. control is unstable
【Other】					
Air Conditioner	2	2			Operation room is under Air Conditioning.
Ambulance	2	2			1 unit: 1 year old, good condition

(5) Base Hospital, Hambantota

Equipment Name	Q'ty	A	B	C	Condition
【Operation】					[Only sterilization operation and other minor operation are performed. New operation building is under construction]
Anesthetic Machine	1	1			
Ventilator	1	1			
Defibrillator	1	1			
Electric Surger	2	2			
Mobile Operating Light	2	2		4 lamps type	
Operating Room Lamp	1	1		Manual type	
Suction, Double Jar	2	2			
Suction, Single Jar	2	2			
【Laboratory】					
Water bus	1				
Water Distiller	1		1		Overage low capacity.
Electronic Balance	1	1			3~4 years old
Colorimeter	1	1			3~4 years old
Hot Air Sterilizer	3	1	2		1 unit: new equipment. 2 unit: not using for small size.
Centrifuge	2	2			
Binocular Microscope	4	2	1	1	2 unit: Japanese made
Laboratory Autoclave	1	1			1 unit: new equipment, not using
【X-ray】					
X-ray System	1	1			6 years old
【O. P. D】					
ECG	1				5~6 years old 1ch. ECG.
Weighing Scale	1				Donation from UNICEF
Pluster Cutter	1	1			
【Obstetric-SBU】					
Photo Therapy Unit	1	1			Grow Lamp is damaged.

(5) Base Hospital, Hambantota

Equipment Name	Q'ty	A	B	C	Condition
Vaccume Extractor	1	1			
Nebulizer	1	1			Air blower type
Infant Incubator	2	2			Overage S/P not available.
【Blood Bank】					
Blood Bank Refrigerator	1	1			New unit is not using because of operation required blood transfusion is not performed.
【Other】					
Mortuary Refrigerator	3	3			6 bodies refrigerator was installed 3 months ago.
Air Conditioner	1	1			For only minor operation room
Ambulance	2	2			12, 20 years old

2-4-5 Conditions of the Ambulances

As seen in Table 2-28 below, relatively new ambulances (purchased in 1990 and 1991) are stationed at Provincial Hospital, Kalutara, Base Hospital, Nuwara Eliya and Base Hospital, Gampaha.

The Line Ministry purchased 50 Japanese ambulances in 1990 and 120 Japanese ambulances in 1991. Among those ambulances, about 20 are not yet distributed to be stationed. In May 1992, those 20 ambulances were kept at the premise of the Medical Supplies Department (MSD).

Table 2-28 CONDITION OF RETAINED VEHICLES

Name of Hospital	Type	Number	Year	Catchment Area	Population	Mobilization	Distance
Teaching Hospital, Peradeniya	Ambulance	3	5 years	2,750km ²	100,000	30	30km
	Van	2	5 years				
	Truck	2	4~8 years				
	Car	2	5 years				
	Bus	1	5 years				
Provincial Hospital, Kalutara	Ambulance	2	1986 1990	Kalutara Gale Ratunapura	900,000 (Kulutara)	3 1	345km 115km
	Pick-up	1	1.5 years				
Base Hospital, Nuwara Eliya	Ambulance	1	1986	2,007km ²	700,000	3	225km
	Ambulance	1	1991				
Base Hospital, Gampaha	Ambulance	1	1990	350km ²	460,000	2	120km
	Ambulance	1	1991				
Base Hospital, Hambantota	Ambulance	1	12 years	Hambantota Mongara Ratunapura	525,000	3~5	600km
	Ambulance	1	20 years				

Source : Hospital Statistics

2-4-6 Conditions of the Buildings

Notwithstanding their sizes and locations, the five hospitals covered in this projects do not have much difference in their building structures and forms. The height limit of the buildings is the second floor, and no building has any underground facility. All the individual buildings of each hospital are connected with roofed passages, and the hospital as a whole looks like a pavilion. The hospitals are built flatly over a vast plain including housing units for doctors and nurses. The main structure of the buildings comprises of posts and beams in the section where the second floor is supported. The floors are of RC construction, and other parts are built with stacked bricks. Most of the roofs are constructed with wood plates and slates. The newest is Teaching Hospital Peradeniya, whose buildings are only eleven years old. The other hospitals are 50 - 100 years old, and their old buildings (mostly used as wards) are added with new buildings for expansion. Teaching Hospital, Peradeniya, Provincial Hospital, Kalutara and Base Hospital, Hambantota have plans to expand their facilities in the future (refer to Figs.2-4, 2-5, and 2-8).

(1) Air-Conditioning

Air-conditioning facilities are best installed in Teaching Hospital-Peradeniya, among the five hospitals. Central air-conditioning is provided to the operating rooms, labor rooms, and premature baby units, and separate air-conditioners are installed for the examination rooms and X-ray rooms. In contrast, air-conditioning is provided only to the operating rooms and ICU's in Provincial Hospital, Kalutara and only to the operating rooms in Base Hospital, Hambantota. Base Hospital, Nuwara Eliya does not have any air-conditioning facilities because it is located on a highland 1,800 meters above sea level, where it is cool during the day. On the other hand, it is cold during the night, but the hospital does not have any heating facilities. In conclusion, most buildings are designed into an open structure to let in winds, so even clinical laboratories and X-ray rooms, in which precision medical equipment are installed, are not air-conditioned.

(2) Power Supplies and Electrical Facilities

The rated voltage in Sri Lanka is 230 Volts or 400 Volts at 50 Hz. Voltage deviation is measured at the clinical laboratories of Teaching Hospital, Peradeniya and Base Hospital, Nuwara Eliya over 24 hours. The devia-

tion at Teaching Hospital, Peradeniya was within 2 or 3% above or below the standard, so the voltage there was stable. On the other hand, the voltage at Base Hospital, Nuwara Eliya was deviating over 10% above or below the standard in small ups and downs all the time. The reason for this voltage fluctuation was considered to be caused not only from the deviation of the primary side of the power supply but also from the insufficient electrical capacity of the electrical facilities of the hospital, which are decrepit over the years (refer to a related document in the appendices). Depending on their locations, hospitals experience power failures with a duration of less than one hour, 2 - 20 times a month. Moreover, depending on seasons, planned power cuts are carried out in provinces like Nuwara Eliya. To avoid the frequent power failures, each hospital is equipped with emergency generators. Among the five hospitals, Teaching Hospital, Peradeniya has the most powerful generator capable of producing 185.5 kVA. On the other hand, Provincial Hospital, Kalutara and Base Hospital, Nuwara Eliya have only small generators for emergency use capable of producing 10 - 20 kVA, and, what worse, those generators encounter frequent break downs. Both the hospitals are experiencing serious problems for clinical activities.

(3) Water Supply

Because water quality greatly affects the performance of precision equipment such as laboratory equipment, High Pressure Sterilizers, dialysis apparatuses, etc., water quality testing was carried out by collecting a water sample at each hospital (refer to a related document in the appendices). On those samples collected, no bacteriological testing was performed, so it is not confirmed that the water at each hospital is suitable for drinking. Except Base Hospital, Hambantota, the water available at the hospitals has been tested "soft", having a low degree of hardness and an extremely small trace of silica. Therefore, the water does not threaten much to cause scale formation in the equipment.

(4) Medical Gas Supply Facilities

In Teaching Hospital, Peradeniya, oxygen, nitrous oxide, vacuum, and compressed air are provided all from a central manifold room through piping to the operation rooms, ICU's, labor rooms, and premature infant rooms. In Provincial Hospital, Kalutara, only oxygen and nitrous oxide are provided through central control. In the other three hospitals, there isn't any such central medical-gas-supply arrangement, so gas cylinders

are brought even into the operating rooms. Those gases used in the hospitals are purchased from a private company in Colombo, and there is no shortage of those gases. The compressors used in Teaching Hospital, Peradeniya for providing vacuum and compressed air have been working for almost eleven years. Because some compressors have broken down over the years, their alternate running is currently not possible.

TABLE 2-29 CONDITION OF PROJECT SITE

		Teaching Hospital, Peradeniya	Provincial Hospital, Kalutara	Base Hospital, Nuwara Eliya	Base Hospital, Gampaha	Base Hospital, Hambantota
BUILDING	Floor Area	12, 715m ²	6, 795m ²	32, 370m ²	20, 000m ²	930m ²
	Floor	Grand, 1F	Grand, 1F	Grand, 1F	Grand, 1F	Grand, 1F
	Structure	Concrete Brick	Brick	Brick	Brick	Brick
	Age	11	40	50, 100	20-60	5-50
POWER CAPACITY	Primary Voltage	400V 3 ϕ	—	400V 3 ϕ	11, 000V	400V 3 ϕ
	Secondary Voltage Transformer	440V 3 ϕ 220V 1 ϕ	400V 3 ϕ 100A	— —	400 3 ϕ —A	100A
	Emergency Power	440V 185.5KVA	230V 10KVA	400V 20KV	380/220V 3 ϕ 50KVA	230V 60KVA
	Voltage Fructuation	5 %	—	\pm 2.5%	—	\pm 5%
	Power Failure	4 / wk	10 / wk	2 / wk	5 / wk	2 / wk
	Duration Power Failure	10 Min.	30 Min.	30 Min.	30 Min.	10-30 Min.
	Standard of outlet	BS	BS	BS	BS	BS
Water Supply & Drainage		City Water Septic	City, Well water Septic	Mt. Water Septic	City, Well water Septic	City water —
Air Conditioning		Nil	Operation Room	Nil	Operation Room	Operation Room
Gas	Medical Gas	Central Supply (O ² , N ₂ O, V Comp. Air)	Central Supply (O ² , N ₂)	—	—	—
	Fuel Gas	LPG	LPG	LPG	LPG	LPG
	Standard of Connector	BS	BS	BS	BS	BS

Source : Hospital Statistics

2-5 Present State of Similar Hospitals

2-5-1 Present State of the Hospitals Improved in Phase I

(1) Hospitals Covered in the Study

The hospitals that have been improved in Phase I Project were studied to extract problems encountered in utilizing the medical equipment procured in Phase I Project. This study is reflected on the basic design so that similar problems can be avoided in carrying out Phase II Project. The following are the four hospitals included in this study, and those hospitals, in turn, include three hospitals which were not studied by the preliminary study team.

- 1) Provincial Hospital, Kurunegala
- 2) Base Hospital, Matale
- 3) Provincial Hospital, Ratnapura
- 4) Base Hospital, Matara

The following are the six hospitals which were not studied this time even though they were included in Phase I.

- 1) Base Hospital, Negombo
- 2) Base Hospital, Panadura
- 3) Base Hospital, Kegalle
- 4) Provincial Hospital, Badulla
- 5) Base Hospital, Polonnaruwa
- 6) Provincial Hospital, Anuradapura (General Hospital)

(2) Conditions of Medical Equipment at the Hospitals Improved in Phase I Project

The equipment procured in Phase I Project was being operated relatively well partly because "Medical Equipment Revitalization Team for Rural Hospital", which was dispatched by the Japanese government, has completed their mission just before this Field survey study was carried out.

Outlines of the hospitals and conditions of some medical equipment are described below.

1) Provincial Hospital, Kurunegala

1. Outline of the Hospital

Provincial Hospital, Kurunegala is located in the southwestern part of North Western Province, and it is a general hospital which meets provincial-level referral services.

The hospital has 1,077 beds and 32 wards, and the average number of patients visiting the hospital each day is 850. As for inpatient accommodation, because there are always from 500 to 600 more patients hospitalized than the total number of available hospital beds, some inpatients are treated on beds placed in corridors of the hospital. The staff is composed of doctors, nurses, midwives, and paramedics.

2. Equipment Conditions

- There are two sets of X-ray equipment installed: one procured in Phase I and the other purchased by the Line Ministry. The sheer size of the hospital makes the X-ray equipment get overloaded even though those two sets are fully and efficiently used.

- Respirators and monitors are installed in the ICU's. Those machines were being operated without any trouble when the study was conducted. Probably, they are not used too frequently to experience a breakdown.

- In the laboratory, there was a flame photometer wrapped in a cover. The equipment had not been used at all since its installation. They say that they cannot operate it because there wasn't sufficient training provided, even on how to operate it, at the time of installation. There is one colorimeter, and it is used for almost all examinations.

- The hospital has four ambulances. Two are used to bring in patients from lower-class hospitals, and the other two are used to transfer patients to higher-class hospitals in Colombo and Peradeniya.

2) Matale Base Hospital

1. Outline of the Hospital

Base Hospital, Matale is located in the center of Central Province, and it takes about one hour to reach the hospital by car from Kandy. The hospital has 538 beds and 16 wards, and the average number of patients visiting the hospital each day is 450. There are 33 doctors and 138 nurses, and they provide secondary medical care for the people living in the northern part of Central Province.

2. Equipment Conditions

- One set of X-ray equipment was running without any trouble. In addition to that, there was another X-ray unit for emergency use, which had been constructed by combining a mobile X-ray unit to a broken transillumination table. The manual-type X-ray film processor procured in Phase I was not being operated because its capacity does not satisfy the work load of the hospital.

- Operation lighting units did not work, even with new battery cells, unless they were plugged into the power source.

- Endoscopes procured in Phase I Project are still being used because of repair services available at a local service agency.

- Distillation apparatus, incubators, and sterilizers have not been used since their procurement and are placed in a storehouse. The hospital is keeping them for use in the microbiological examination ward, which is planned to be newly built.

- The equipment used for physiotherapy is all operable, and its items are of high-grade because a kinesitherapy room has been added recently.

- One of the two infant incubators installed was not operated because of the malfunction of its temperature controller.

- One of the two mortuary refrigerators, each capable of storing two bodies, was running with repair work received from a private company. However, the other was broken down.

They say that refrigerators of this type are not covered by the work of the BES, so it takes a long time for the refrigerator to be repaired because it requires a new budgetary allocation from the provincial government.

- A dental unit was working all right, but there was a small problem associated with its air turbine. The water switch was not operable,

so it was opened by being twisted with a screwdriver before every use.

3) Provincial Hospital, Ratnapura

1. Outline of the Hospital

Provincial Hospital, Ratnapura is located in the center of Sabaragamuwa Province, and it provides tertiary medical care for the province. The hospital has 886 beds and 12 specialists, 65 general doctors, 250 nurses, and 35 paramedics. The average number of patients visiting the hospital each day is 1,000 -1,500.

2. Equipment Conditions

- The indication of the monitors used for electrocardiogram E.C.G. in the ICU are in Japanese (for use in Japan).
- The glow lamp of the phototherapy apparatus installed in the ICU for neonates was damaged. Because acquiring a new lamp for replacement is impossible, the apparatus is not used.
- Mercury sphygmomanometers (about 30 units) are short of mercury because of leakage. As mercury is not easily acquired, they are not repaired for use.
- The oscillator of an ultrasonic nebulizer installed in the pediatrics department is broken and not repairable.
- The staff does not know very well how to operate as well as how to maintain dental units. There is much trouble caused from scale deposition in the water line of the hand pieces. There was another problem that new hand pieces acquired after the procurement of Phase I were not what they intended to have.
- There are a few electronic balances that need some adjustment. Their reading is not stable.

4) Base Hospital, Matara

1. Outline of the Hospital

Base Hospital, Matara belongs to Southern Province and is located at the southern end of Sri Lanka. It provides secondary medical care for Matara District.

The hospital has 670 beds, which is the largest as base hospital. There are a total of 627 staffers including 63 doctors, 225 nurses, 33 midwives, 63 paramedics, etc. The average number of patients visiting the hospital each day is about 900.

2. Equipment Conditions

- The X-ray equipment is running at the moment because it has received a "first aid" repair from the above mentioned "Equipment Revitalization Team". However, the X-ray tube does not produce regular power outputs. The tube has not been replaced since the installation of the equipment (probably worn out).

- The oscillator of an ultrasonic nebulizer installed in a ward was damaged and not repairable.

- The staff did not know very well how to operate the fetal' heart detector, and they misunderstood the need of recharging the incorporated battery as a breakdown of the equipment.

- The flame photometer had been working for the three months immediately after its installation, but it is not used now because the piece of equipment does not run smoothly. They say that the explanation given at the time of equipment handing-over was not enough to know the operation and maintenance of the equipment.

- One corpse refrigerator capable of storing two bodies is broken down.

- Distillation apparatus are running, but they do not seem to satisfy the hospital's needs.

- Consumables listed below are hard to acquire:

Infrared lamps used in infrared-irradiation treatment for physiotherapy,

Lamps for light source used in microscopes,

Magnet-type disposable electrodes used with defibrillators, etc.

2-5-2 Present State of Other Similar Hospitals

Because artificial dialysis apparatus and X-ray apparatus for angiography are included in the request made for this project, a study was conducted to observe the dialysis apparatus and X-ray angiography apparatus used in two public hospitals, Teaching Hospital, Colombo and Sri Jayawardenapura Hospital.

(1) Teaching Hospital, Colombo (commonly called "Colombo General Hospital")

1) Artificial Dialysis Unit

The artificial dialysis unit of Teaching Hospital, Colombo was opened in 1983, and it is the only public dialysis unit operating in Sri Lanka. It has four beds for artificial dialysis and four beds for peritoneal dialysis, and it treats about 390 patients a year.

There are four dialysis apparatus. One of those apparatus is of a type developed about 20 years ago, two are made in 1983, and the last one is the newest purchased in 1991. Now, the newest one is waiting for guaranteed repair work and not working, but the other three are running normally, utilizing the water treated with a reverse osmosis apparatus (RO apparatus). The reuse of the same dialyzer and blood circuit to the same patient is limited to twice. The equipment is used in good condition. The staff consists of a head nurse, who received training abroad before the opening of the dialysis unit, and ten nurses. Those nurses are well trained.

2) Angiography X-ray Unit

The Line Ministry purchased a handy-type angiography unit consisting of an X-ray transillumination table, a movable X-ray tube suspended from the ceiling, and a film exchanger, all of which are made in Japan.

The unit is now maintained through a one-year guarantee. Even after the expiration of the guarantee period, the hospital has a maintenance arrangement which includes replacement parts for a period of five years with a local agency. This maintenance arrangement is attached to every piece of equipment purchased by the Line Ministry.

(2) Teaching Hospital, Sri Jayawardenepura (commonly called "Sri Jayawardenapura General Hospital")

1) Artificial Dialysis Unit

Two artificial dialysis units made in the U.S.A. were installed with a R.O. system, dialyzers, blood circuits, etc. about two months ago, and periodical checking is performed by the supplier. However, at present, only the training of nurses has been completed, and no doctors are assigned yet. There isn't any plan yet when dialysis care will start.

2) Angiography X-ray Unit

A handy-type angiography unit was procured with a CT scanner through a grant offered from the Japanese government in 1989. The unit consists of an X-ray transillumination table, a movable X-ray tube suspended from the ceiling, and a film exchanger, all of which are made in Japan. The apparatus is mostly used for the angiography of legs and arms, and this angiography service is offered to patients twice a week. A radiologist, who has been trained in Saudi Arabia, is in charge of the unit.

Consumables used with the apparatus such as catheters are supplied from the MSD regularly, so they are always available. The maintenance of the unit is being carried out by the local agency of the supplier in compliance with a maintenance arrangement which includes spare parts for a period of five years.

(3) Nawaloka Hospital

This Hospital is well known as a comprehensive private general hospital which is one of the most modernized ones in Sri Lanka. It was opened in September, 1985 and possesses 150 patient beds. The hospital provides services for outpatients, Pathological Laboratory, Pharmacy, Physiotherapy, X-ray Department, Operating Theater, Blood Bank, Maternity Department, Intensive Care Unit and Wards. Concerning the medical equipment, the hospital possesses such most sophisticated equipment as CT scanner, EEG, etc.. For such equipment, the hospital makes a service contract with an agency in purchasing it and seldom encounters serious problem about maintenance of medical equipment.

2-6 Present State of Maintenance System

(1) General Situation

Maintenance at each hospital is carried out in two systems: one for facilities and installations and the other for medical equipment. Here, the term "facilities and installations" include things installed to furnish the buildings such as electrical installations, generators for emergency use, and air-conditioners. The maintenance of such facilities is carried out by an engineer dispatched from the Electric Board.

Maintenance of most medical equipment is carried out by the BES, which is one of the departments of the Ministry of Health and Women's Affairs. The BES performs checks and repairs including the supply of necessary spare parts. However, there are a few exceptions to the items of medical equipment that are maintained by the BES. For example, mortuary refrigerators are maintained by private companies. Consumables such as chemical reagents necessary for the operation of a certain machine are supplied through "Drug Store", i.e., the medical-materials supply department of each district, after distributed from the Medical Supply Department (MSD), which is under the direct control of the Ministry of Health and Women's Affairs.

(2) Maintenance Work under the Ministry of Health and Women's Affairs

There is not any section functioning for the maintenance of medical equipment at each hospital. So, the maintenance system works like the following. When some equipment break down, a pharmacist phones the BES and requests a repair service. Teaching Hospital, Peradeniya is the only exception. It has a workshop inside the hospital, and a BES engineer is stationed to carry out relatively simple maintenance work. When a complicated problem, e.g., malfunction of an electrical circuit, comes up, either a new engineer from the BES is called in, or the unit of equipment is sent to the BES.

(3) Private, Local Representatives of Suppliers

1) Agency A Dealing with Medical Equipment

Agency A has oscilloscopes, multitesters, tools for electronic equipment, and measuring devices for qualitative testing of X-ray equipment. This agency has about five engineers in electronics and mechanical engineering. In Sri Lanka, it is commonly accepted that

sophisticated equipment purchased by the Line Ministry must be accompanied by spare parts necessary for five years of maintenance, free of charge. Agency A, studied by this Basic Design Team, performs periodical checks and repairs. The engineers have studied mechanical engineering or electronics at universities in Sri Lanka, and they have received training from the manufactures. By referring to circuit diagrams, they can point out the troubling part of the equipment in repair work, excluding such sophisticated equipment as X-ray units and ultrasonic diagnostic-units. However, repair work sometimes takes a long time because it is not easy to acquire a special part necessary for repair from abroad. From six months to one year is spent for required import procedures.

2) Agency B

Agency B mostly deals with dental equipment and dialysis apparatus made in the U.S.A. Two or three engineers who have received training from the supplier are stationed at the agency. So far, Agency B has supplied one dialysis apparatus to one of the national hospitals, i.e., Colombo General Hospital, two apparatus to Nawaroka Private Hospital, and four to Lanka Medical Company Limited. All those dialysis apparatus are supplied with the offer of maintenance service necessary after the purchase.

Although there are engineers for repair, one dialysis apparatus was out of order in Colombo General Hospital when the field survey was conducted by the study team. This is due to a long time required for acquiring a necessary spare part.

3) Agency C

Agency C is a blue-chip company, which deals with not only medical equipment but also general consumer goods including tea. The company has two engineers who have received training from manufacturers of medical equipment. It has tools necessary for repairing electronic equipment including oscilloscopes (with memory). There is an agreement attached to every equipment purchased by any of the hospitals under the Line Ministry, which agreement requires five-year maintenance including necessary spare parts for the equipment after its one-year guarantee period. Because of this, those engineers perform equipment checking almost daily. In addition to the equipment supplied to the hospitals under the Line Ministry, they plan for peri-

odical checks for the equipment supplied to other hospitals as well, and they travel to carry out the scheduled checks.

4) Agency D

Agency D has a total of four engineers, and two of them have completed a training session provided at the supplier's factory. They are able to overhaul sophisticated equipment such as a CT scanner.

In the same way with the above mentioned agency, this agency is also obliged by an agreement to provide five-year maintenance service after the expiration of one-year guarantee period for the equipment delivered. So, those engineers also perform equipment checking almost daily.

(4) Problems

1) Spare Parts for Replacement

According to an engineer at the BES, it sometimes takes one year to acquire a spare part. Because of this, they have to wait for a long time before repairing the equipment. In addition, there is another problem. No interchangeability of similar parts exists among the same kind of equipment made by different manufactures, so different parts or spare parts have to be acquired for the same function but for different items of equipment. This results in many items of parts to be procured for replacement and complicates the procurement process. There is another problem. Because the number of each item ordered is small, so is the total amount for payment. For such a small purchase, agencies are sometimes not willing to carry out a complicated import procedure.

2) BES's Maintenance Ability

Currently, the BES is the only section that is in charge of maintaining the medical equipment installed in the public hospitals. The staff consists of four engineers including a director and 20 technicians.

Each staffer belongs to one of the sections of electrical engineering, electronics, mechanical engineering, etc. Either a staffer goes to the hospital after receiving a request, or if the equipment cannot

be repaired there, the equipment is brought to the BES. Furthermore, the BES carries out periodical checking on certain items of equipment. For example, periodical checks have been carried out on electrical steam-sterilizers since 1991. Several chambers had exploded before the importance of periodical checking was recognized. However, periodical checks are made on only some units of equipment, and most equipment is taken care of only after it is affected with some problems. Not enough attention is paid to maintain such equipment as X-ray units, which need periodical performance checking, or distillers, which require periodical cleaning.

For the equipment purchased from the budget of the Line Ministry, there is an obligation that spare parts necessary for the operation of the equipment for five years should be provided free of charge in addition to the one-year guarantee. For such equipment, few problems are experienced because it is taken care of by private agencies.