Korea

Medical and Health Research Institutions Equipment Modernization Project

Repot Date: March 2002
Field Survey: July 2001

1. Project Profile and Japan's ODA Loan

Site Map：Nationwide Program

Site Photo：Angiography system procured by the project at National Medical Center

1.1 Background

In the Republic of Korea (ROK), 'demand for medical and environmental sanitation has been on an upward trend, being accelerated by rapid economic growth as well as urbanization/population increase. These changes have also been characterized by an increased complexity and diversification. National/city/provincial medical and health research institutions were supposed to play a central role in enhancing the welfare of the people in the field of medical services and environmental sanitation. However, these institutions faced severe shortages and obsolescence of equipment and so they have not yet been ready to fulfill their expected functions as the central medical and health research institutes of the nation. The Government of the ROK planned to provide adequate medical services and to maintain and promote healthy lives for the nation through the establishment of measures for health and environmental sanitation and by strengthening the functions of examination and inspection of foods, medicine and so on.

1.2 Objective

The project aimed to achieve qualitative and quantitative improvement in medical, health and environmental sanitation equipment at national hospitals and national/city/provincial health and research institutions where modernization had fallen behind.[1]

1.3 Project Scope

The project aimed to procure a total of 942 types of equipment: 446 types of equipment for five national hospitals and 496 types of equipment for national/city/provincial health and environmental research institutions. The ODA loan was to be utilized to fund the entire foreign currency portion of the project cost.

1.4 Borrower/Executing Agency

The Government of the Republic of Korea / Ministry of Health and Social Affairs (Ministry of Health and Welfare at the time of post-evaluation)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	4,000 Million Yen 3,867 Million Yen
Date of Exchange of Notes Date of Loan Agreement	January 1980 January 1980
Terms and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 4.0% 25 Years (7 Years) General Untied
Final Disbursement Date	January 1985

2. Results and Evaluation

2.1 Relevance

According to the statistics of the mortality rate of major diseases and wounds in 1974 in the ROK, tuberculosis, which was curable with medical treatment available at that time, was listed as one of the major causes of death. The health condition of people in the ROK fell behind those in Japan. While the number of general hospitals had increased over the period from 1973 to 1977, the number of hospitals, tuberculosis and leprosy hospitals, health centers, etc. was either leveling-off or decreasing as shown in the following table.

Table 1: Number of Medical Institutions

Year	General Hospital	Hospital	Tuberculosis	Leprosy (Note)	Health Center	Sub health-Center	Oriental Medicine clinic
1977	51	179	4	6	200	1,336	2,351
1976	43	141	4	6	198	1,336	2,366
1975	37	128	4	6	198	1,338	2,377
1974	36	124	4	6	197	1,340	2,367
1973	17	185	7	7	193	1,342	2,528

Source：JBIC Appraisal Documents

Note：Including sanatorium

In addition to the necessity of expanding specialized hospitals, the people's demand for medical services and environmental sanitation was on an upward trend and showed increased complexity and diversification. Rapid economic growth as well as urbanization and population increase contributed to this trend. On the other hand, various types of equipment in the areas of public hygiene and environmental sanitation were not adequate. Under the project, it was planned to introduce new equipment at national/city/provincial medical and health research institutions. As these institutions were experiencing severe shortages and obsolescence of equipment, it is evaluated that the project plan was relevant in terms of the development needs of the country.

Although the conditions of medical services and environmental sanitation have significantly improvedsince the time of the appraisal, it is considered that continuous efforts will be required for further improvements. While the incidence of infectious diseases has declined, the incidence of degenerative diseases has been consistently rising with increases in the elderly population. Furthermore, the government of the ROK has been transforming treatment-focused health care policies into prevention-focused health promotion policies. The objective of the project – an achievement of quality improvement in medical and health functions - is still relevant in the current development context of the country.

2.2 Efficiency

① Project Scope

Under the original project scope, a total of eighteen (18) institutions were to be project beneficiaries, five (5) national hospitals (National Medical Center, two (2) National Tuberculosis Hospitals, National Hospital of Psychosis, National Hospital of Leprosy) and thirteen (13) national/city/provincial health and environmental research institutions (National Institute of Health, National Institute of Environmental Research, eleven (11) city/provincial health research institutions). In practice, excepting Busan City Health and Environment Research Institute, which was pulled out of the project scope, all the institutions became the project beneficiaries as planned.[2]

Under the project, it was planned to procure a total of 942 types of equipment, 446 types of equipment to five national hospitals and 496 types of equipment to thirteen national/city/provincial health and environment research institutions. However, at the time of the post-evaluation, it was not possible to collect comprehensive data on the types of equipment actually procured. During the post-evaluation, a sample case study was conducted at some of the beneficiary institutions. The National Medical Center in Seoul had received some equipment under another Japanese ODA project, the Medical Facilities Expansion Project, prior to this project. Under these two Japanese ODA projects, the center was equipped with about 550 units/sets of equipment (operating beds, incubator, ultrasonic, etc.). At the National Institute of Health in Seoul, the project was also followed by another ODA project, the Safety Research Center Project of the National Institute of Health. Under these projects, a column chromatography and an electroenforcing system (a protein separator), etc. were procured.

②Implementation Schedule

Installment of medical equipment was completed three years behind the planned schedule. According to the executing agency, this is due to the fact that all the equipment was procured through the Office of Supply, the Republic of Korea (OSROK), whose name was changed to the Supply Administration, the Republic of Korea (SAROK) at the time of the post-evaluation.

Table 2：Comparison of Original and Actual Schedules

Item	Original Schedule at the Time of Appraisal	Actual Schedule
（First Procurement） All the 18 institutions	Fourth Quarter 1979～ First Quarter 1981	First Quarter 1981 ～Fourth Quarter 1984
（Second Procurement） National Institute of Health National Institute of Environmental Research	Fourth Quarter 1980～ First Quarter 1982	First Quarter 1981 ～First Quarter 1985

Source：Ministry of Health and Welfare

③Project Cost

The foreign currency portion (which is equivalent to the amount of the Japanese ODA loan) of the project cost was disbursed as originally planned. It was not possible to examine the amount of the local currency portion. In terms of the allocation of the foreign currency portion to the respective beneficiary institutions, the allocation was done basically in accordance with the original plan with some minor changes.

2.3 Effectiveness

① Utilization of Equipment Procured

[2] Out of the two tuberculosis hospitals, National Gongju Tuberculosis Hospital was reorganized into a mental hospital.

Under the project, many units of equipment were procured at many different beneficiary institutions. Furthermore, 15 years have already passed since project completion. Therefore, a comprehensive examination of the utilization aspect of the equipment was not carried out. For the purpose of the post-evaluation, a questionnaire survey to all the institutions and two site visits (National Medical Center and National Institute of Health) were conducted. According to the results of the survey, some of the equipment was still being utilized while others had already been disposed of or were out of order because 15 to 20 years had passed since the procurement of the equipment. For example, much of the equipment at the National Medical Center in Seoul was disposed of due to less availability of spare parts and the obsolescence of the equipment itself. However, some of the equipment, such as operating tables and incubators, was still being utilized. At the National Institute of Health in Seoul, part of the institute was reorganized into Korea Food Drug Administration (KFDA) and as a consequence, some of the equipment was also transferred to KFDA. The reorganization made it more difficult to trace the present condition of the equipment procured. During the visit, it was confirmed that a column chromatography procured in 1984 had been used for storage for the past since three years due to problems with adjustment of the temperature. A freeze dryer had been utilized until 2000 but was not used any more due to obsolescence. An electroenforcing system, a protein separator, was still being utilized.

②Number of Operations, X-rays, and Laboratory Tests at the National Medical Center in Seoul

Table 3 shows the number of operations, x-rays, and laboratory tests carried out at the National Medical Center in Seoul by year. Comparing the record of 1978 (which was obtained at the appraisal time) with that of 1985 (which was obtained at the time of the project completion), the number of X-rays increased by 20% (an annual average increase of 3.1%) and the number of laboratory tests increased by 100% (an annual average increase of 10.5%). The data for the number of operations was missing in 1985 but a comparison of the figure in 1978 with that in 1990 shows an increase of more than 70% (an average annual increase of 5%). Compared with the tendency from 1985 to 2000, this trend continued up to 1990 and in the 1990s, the rate of increase declined, or figures in absolute values decreased. It is assumed that while the National Medical Center responded to a rapid supply increase of medical services in 1980s, the project contributed to improvements of the medical infrastructure at its early stage.

Table 3：Number of Operations, X-rays, Examinations at the National Medical Center

	1978	1979 (Appraisal)	1980	1985 (Project Completion	1990	1995	2000	2001 (Forecast)
National Medical Center in Seoul								
Operations(times)	3,935	N.A.	N.A.	N.A.	6,927	5,828	5,028	N.A.
X-ray (times)	78,802	N.A.	N.A.	97,833	113,800	127,939	127,532	138,000
Examinations(times)	443,707	505,298	566,185	894,230	1,420,087	1,956,045	1,699,181	1,580,000

Source：National Medical Center except the data in 1978, which are from the JBIC Appraisal Documents

③Number of Experiments at National Institute of Environmental Research

Table 4 shows the number of experiments carried out at the National Institute of Environmental Research. According to the procurement plan for equipment, 17 out of 29 types of planned equipment were to be used for the analysis of air pollution. Accordingly, the number of experiments for air pollution recorded a more than sevenfold increase at the time of project completion in 1985, if compared with the number at the time of the appraisal. It is understood that the number of experiments depends on the necessity in society. The number decreased thereafter to 60 times in 1990. It is assumed that the sudden increase in 1985 was made possible through the reinforcement of equipment under the project.

Table 4：Number of Experiments at National Institute of Environmental Research

Unit：Times

Major Fields	1979 (Appraisal Time)	1980	1985 (Project Completion)	1990	1995	2000	2001 (Forecast)
National Envrionmental Protection Institute in Seoul							
Air Pollution	20	50	150	60	60	70	120
Atmospheric Phenomena	N.A.	10	12	15	15	10	15
Noise and Vibration	10	10	15	15	15	15	25
Improvement of Atmospheric Quality	N.A.	N.A.	N.A.	200	100	200	200
Spesific Features of Devices to decrease Exhaust Gas	N.A.	N.A.	N.A.	70	80	30	50
Substance for Lesion to Endocrine System	N.A.	N.A.	N.A.	N.A.	N.A.	50	50

Source：National Institute of Environmental Research

2.4 Impact

① Contribution to Improvement of Supply System of Health and Medical Services

In the ROK, the health and medical environment has rapidly improved since the second half of 1970s as various statistical data in the tables below show. The cause and effect relation between the project and improvement of various health indicators was not clearly traced. However, the role of the project is seen against a background where the nation-wide medical supply system was being improved. It is assumed that the project contributed to the improvement of services at central institutions in the fields of medical/health and environmental sanitation to a certain extent.

Table 5：Incidence Rate of Infectious Diseases（per 100,000 persons）

Unit: Case/Person

	Tuberculosis Note	Japanese Encephalitis	Typhoid Fever	Diphtheria
1973/1975	2,914.3 (1975)	0.3 (1975)	1.5 (1975)	1.0 (1975)
1980	-	0.3	0.5	0.1
1985	-	-	0.5	0.0
1990	-	0.0	0.5	-
1995	69.0	-	0.8	-
1998	46.2	0.0	0.8	-

Source：The data from 1973/1975 is from the appraisal documents. The data from 1980 is from Yearbook of Health and Welfare Statistics, Ministry of Health and Welfare.

Note：In the case of Tuberculosis, the figures are newly registered tuberculosis patients at health centers.

Table 6：Registered Leprosy Patients at Health Centers

Year	Cases by Residence（Person）
1975	32,152
1980	27,964
1985	25,594
1990	23,833
1995	21,185
1999	18,689

Source：Yearbook of Health and Welfare Statistics, Ministry of Health and Welfare

Figure 1 : Life Expectancy at Birth

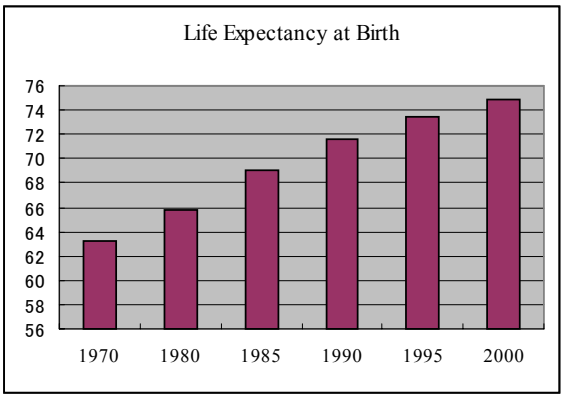
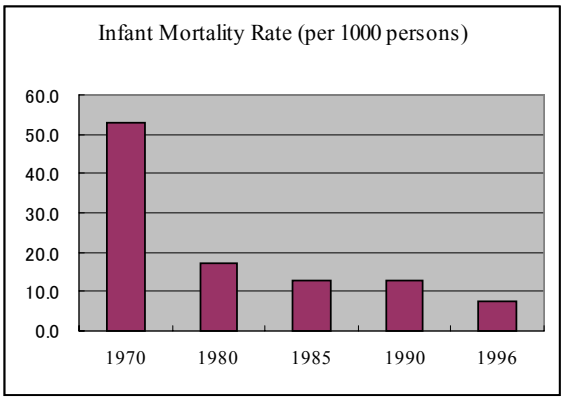


Figure 2: Infant Mortality Rate



Source: Ministry of Health and Welfare

Note :

1) Life Expectancy at Birth=The number of years a newborn infant would live if prevailing patterns of mortality at the time of birth were to stay the same throughout the child's life.

2) Infant Mortality Rate=the probability of dying between birth and exactly one year of age times 1000.

② Environmental Impact

The National Medical Center in Seoul commissioned accredited companies that had met environmental standards to dispose waste materials that might carry the risk of infection (gauze, internal organs, needles, etc.). At the National Institute of Health, poisonous materials were treated at the waste treatment plant. The institute was equipped with a wastewater treatment plant. Private environment management companies that had been accredited by an environmental agency examined the quality of treated wastewater twice a month. The results were reported to KFDA. When it was impossible to treat poisonous materials inside the institute, private specialized agents that had been accredited by an environmental agency were called upon to take care of the materials.

Although the above sample survey shows only a portion of practices carried out by project beneficiaries, no problems were reported as management companies that had met environmental standards were involved in treatment of medical wastes, as described above.

2.5 Sustainability

① Operation and Maintenance

The respective beneficiary institutions have been carrying out operation and management (O & M) of the project since its completion. At the National Medical Center, where the site visit was conducted, there were 218 physicians, 366 para-medical personnel, and 11 engineers[2]. Engineers handled the operation of the medical equipment. Minor repair works were done by engineers but major troubles were contracted out to external agents. It is assumed that, similarly at other institutions, maintenance works were being carried out either by internal engineers or external agents.

② Financial Conditions

There were three institutions that responded to the questionnaires on financial conditions at this evaluation. Their responses are shown in the following table. The operations of these institutions have been carried out with financial assistance from the government.

[2] Physicians include Doctors, Special Doctors, Interns, and Residents. Para-medical staff includes Nurses, Pharmacists, and Medical Technologists. Engineers include Engineering Technicians and Bioengineering Staff who are responsible for the operation of maintenance of equipment and facilities but does not include administrative staff.

Table 9： Financial Conditions in 2000 Unit：Million Won

	National Medical Center in Seoul (Note)	National Masan Tuberculosis Hospital	National Hospital of Psychosis in Seoul
Revenue	42,843	6,430	8,299
Expense	47,027	5,647	13,820
Income after Tax	-4,184	783	-5,521

Source：Respective Hospitals

Note：The income of the National Medical Center in Seoul was not negative in 2000. However, as the center adopted the double entry system and recorded accumulated losses in the year, the income in 2000 in fact turned out to be negative. Although the amount of after-tax income in 2000 was minus 4,184 million won, the income was minus 630 million won if the government subsidy was taken into account.

When the post-evaluation was conducted, fifteen years had already passed since project completion. Therefore, much of the equipment procured under the project', had already been disposed. The project was implemented in order to achieve qualitative improvement in the medical/health and environmental sanitation service provided by central institutions, at early stage of time when nation-wide supply system of medical services was being established in the ROK. It is considered that the project had fulfilled its role by the time when the post-evaluation was conducted.

Comparison of Original Plan and Actual

Item	Plan	Actual
① Project Scope Procurement of equipment for medical and health/environmental sanitation at national hospitals and national/city/provincial health and environment research institutions	Total of 18 institutions （5 national hospitals and 13 national/city/provincial health and environment research institutions）	Total of 17 institutions （5 national hospitals and 12 national/city/provincial health and environment research institutions）
②Implementation Schedule	4th quarter 1979～ 1st quarter 1982	1st quarter 1981～ 1st quarter 1985
③Project Cost Foreign Currency Local Currency （Local Currency in Won） Total ODA Loan Portion Exchange Rate	 4,000 Million Yen 1,062 Million Yen （2,442 Million Won） 5,062 Million Yen 4,000 Million Yen 1 Won＝0.43 Yen （October 1979）	 3,867 Million Yen NA （NA） NA 3,867 Million Yen 1 Won＝0.31 Yen （Average of 1980～1985）

Source：JBIC and Ministry of Health and Welfare