Korea

Regional Hospital Equipment Improvement Project

Report Date: March, 2002
Field Survey: February, 2002

1. Project Profile and Japan's ODA Loan

Site map: 53 hospitals throughout the country

Site Photo: Operating Table procured under the Project (Songnam Hospital)

1.1 Background

In the field of medical services in the Republic of Korea (ROK), human resources development, such as the number of physicians and education system, had attained an appropriate level in general., However, the insufficiencies of medical facilities were still significant. For example, the number of beds per 100,000 population was 142[1]. Furthermore, the improvement of medical security systems such as medical insurance and medical aid, which was put into practice in 1977, was expected to mobilize greater demands for medical services in the country.

In the light of this, it was deemed necessary to urgently increase and modernize medical facilities. For this purpose, the Government set the Medical Facilities Expansion Long-Term Plan (1980-2000), whereby the ultimate target of the number of bed per 100,000 population was set at 400 beds, with objective to establish a medical security system for the people.

This project formed part of the first phase of the above long-term plan. The project was to provide an additional 5,500 beds, which represented one-fourth of the total shortage of bed (22,000 beds), in order to achieve the target of the first phase of the above plan, increasing the number of inpatient beds per 100,000 population to 165 beds. ,

1.2 Objectives

The project aimed to construct private regional hospitals at 64 sites throughout the country in order to establish a minimum basis for diagnosis and treatment.

1.3 Project Scope

The project was to construct new regional hospitals in 64 administrative units out of the 214 units in the country, which would meet a certain set of conditions[2]. Japanese ODA loan was to be utilized for procurement of the medical equipment required at the hospitals.

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[1] The data includes the number of beds at all the medical institutions as of December 1978.

[2] Prior to this project, a Japanese ODA loan was provided to the ROK for the implementation of Medical Facilities Expansion Project in 1977, in which the basic medical equipment was to be supplied to city/provincial hospitals, hospitals in industrial complexes and in medically weak areas (private hospitals). This project targeted areas where no city/provincial hospitals existed and no private hospitals.

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 the post-evaluation)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	13,000 million yen 12,441 million yen
Date of Exchange of Notes Date of Loan Agreement	January, 1981 February, 1981
Teams of Conditions Interest Rate Repayment Period (Grace Period) Procurement	 4.0% 25 years（7 years） General untied
Final Disbursement Date	February, 1987

2. Results and Evaluation

2.1 Relevance

The project was undertaken as part of the first phase of the Medical Facilities Expansion Long-term Plan (1980-2000). According to the appraisal documents, in 1978 the number of beds per 100,000 population was 142, and regional differentials within the country as well as a large gap with the conditions in other developed countries were evident. In consideration of the medical environment at the time of the appraisal, the project plan was deemed relevant as it aimed to establish a minimum basis for diagnosis and treatment.

Table 1 compares the actual number of beds by city/province in 1978, 1989 and 1999. The statistics in 1989, after completion of the project in 1987, show that the national average exceeded 300 beds per 100,000 persons and the figures in all the city/provinces exceeded 200 beds. However, if compared with those in other developed countries, a gap remained. It is evaluated that the project remained relevant at the time of project completion.

Table 1：No. of Beds per 100,000 persons by Region

Unit: Bed

	1978	1989	1999
Seoul	214	337	513
Pusan	198	344	638
Kyonggi	105	276	471
Kangwon	128	339	754
Chungbuk	85	283	637
Chungnam	92	276	615
Chonbuk	109	220	623
Chonnam	138	343	626
Kyongbuk	128	246	496
Kyongnam	98	303	550
Cheju	129	269	403
National Average	142	301	545

Table 2：No. of Beds per 100,000 Persons by Country

Unit: Bed

Country	1980	1990	1997
Australia	1,230	-	830
Canada	670	620	470
France	1,110	970	850
Germany	1,150	1,040	940
Italy	970	720	590
Japan	1,380	1,600	1,640
Korea	170	310	480
UK	810	590	430
USA	600	490	390

Source: The statistics in 1978 was from JBIC Appraisal Documents and the rest was from Yearbooks of Health and Welfare Statistics, Ministry of Health and Welfare.
Note: Due to the limited availability of actual data for 1989, the figures for 1989 in Figure 1 were calculated with the number of beds in 1989 and the population by city/province in 1988.

2.2 Efficiency

2.2.1 Project Scope

The project planned to construct and improve private regional hospitals in the area where it was not possible to eradicate the absolute shortage of beds only through the improvement of public medical institutions. The distribution of beds at hospitals were concentrated in urban areas. . Therefore, considering regional balance and the peculiarity of regions where the number of beds was 130 or less than 130 per 100,000 population, the executing agency selected 64 sites as project sites. Out of the 64 hospitals planned at the time of the appraisal, assistance to 11 of the hospitals was later cancelled so that the actual number of project hospitals resulted in 53[3]. Assistance under the project was not limited only to new hospitals but was also extended to existing hospitals. The Japanese ODA loan was to be on-lent to private hospitals by the Ministry of Finance and Economy through the Ministry of Health and Social Affairs. Upon commencement of the project, target project hospitals were re-examined based on actual conditions and requests from the respective hospitals.

The items of medical equipment to be procured varied. Centering on the basic equipment required for new hospitals, the list of the equipment and facilities covered X-ray, operation, anesthesia, etc. (about 600 units). According to the plan at the time of the appraisal, the medical equipment to be purchased was standardized in accordance with the number of beds at the hospital (50, 80, 100, and 150 beds). For example, a hospital with 50 beds was to have twelve clinical departments (divisions) such as internal medicine, general surgery, obstetrics and gynecology, pediatrics, etc. and was to procure 340 units for 189 items. Hospitals with 100 beds were to have 24 clinical departments (divisions) and were to procure 608 units for 336 items. As it was difficult to obtain comprehensive data of procurement and distribution of medical equipment by the project for the post-evaluation, case studies were conducted. Songnam Chungang Hospital in Kyonggi-do procured, for example, CT (Computerized Tomography), equipment for X-ray, operating tables, etc. and Songnam Hospital purchased equipment for X-ray, operating tables, etc. under the project.

2.2.2 Implementation Schedule

The project started in October 1980 and was completed in December 1986, four years behind the completion schedule originally set in December 1982. As for the reasons behind the delay of the implementation schedule, the executing agency pointed out delays in the construction works at some of the project hospitals and delays in the procedures for equipment procurement.

2.2.3 Project Cost

The foreign currency portion (Japanese yen loan portion) of the project cost was spent mostly as planned. As for the local currency portion, the actual amount was not confirmed.

2.3 Effectiveness

①Utilization of Equipment Procured

Since 14 years had passed since the procurement of the equipment under the project, it was difficult to carry out a comprehensive examination of the current status of the equipment. Hence, the case studies were conducted at a couple of project hospitals.

Songnam Hospital opened in May 1982 with 150 beds. A high-pressure steam sterilizer (disposed of in

[3] Out of the 53 hospitals, some went into bankruptcy while others could not be identified. At the time of the post-evaluation, answers to the questionnaires were received from 33 hospitals. Conditions such as the number of beds were made available.

1994), a universal operating table (in use at the time of the site visit) and an audiometer (out of order at the time of the site visit) were among the equipment procured at the hospital. It was estimated that the equipment still in use, such as the operating table, accounted for less than 10% of the total equipment procured. According to the hospital, the medical equipment was replaced in some cases because, as the medical equipment procured under the project had been manufactured in foreign countries, certain foreign manufacturers no longer produced spare parts for the equipment or the hospital found it more expensive to repair the equipment than to replace it. Furthermore, some of the medical equipment procured under the project, such as the dental X-ray equipment and dental unit, was not utilized. It is considered that unutilized equipment existed because of , lack of sufficient coordination within the hospital itself and also between the hospital and the Office of Supply with regards to the selection of types and specifications of the equipment to be procured, as the hospital was newly constructed. Problems were not reported in terms of the operation and operation manuals of the equipment.

Songnam Chungang Hospital started its operation in 1977 and had the project equipment delivered around 1984. The number of beds at the hospital in 1984 was 80. Among the equipment procured was X-ray equipment, CT, an autoclave, an audiometer, etc. By the time of the site survey, all the equipment had been already disposed of. According to Songnam Chungang Hospital, as all the agents of the manufacturers ran offices within the country, they were able to have the equipment repaired if they could wait for the spare parts to be delivered.

At Inchon Gil Hospital[4], some equipment procured under the project, such as an operating lamp and phototherapy equipment, was still in use. The hospital explained that about 50% of the equipment procured was being utilized.

②Contribution of the Project in terms of the Number of Inpatient Beds

Table 3 compares the actual results in 1987 with the plan at the time of the appraisal in terms of the number of hospitals and inpatient beds by city/province. Out of the 33 hospitals that responded to the questionnaires at this evaluation, valid answers were 23 for the actual achievement in 1987. While 5,500 beds were to be provided by 64 project hospitals altogether, in reality, the 23 hospitals provided 8,381 beds exceeding the planned figure. A close look at the statistics by city/province tells us that the actual number of beds exceeded the planned number in all the areas except Chonnam and Cheju, although the actual number of hospitals was less than the planned number. The average number of inpatient beds at the project hospitals was 364 beds per hospital, higher than the planned number, 86 beds. The capacity of the project hospitals increased in terms of the number of inpatient beds.

[4] The hospital was originally part of Dong-Inchon Hospital. In 1987, it expanded and became independent as Inchon Gil Hospital.

Table 3：Comparison of Plan and Actual in terms of No. of Hospitals and Beds

	Plan at Appraisal		Actual in 1987	
	No. of Hospitals	No. of Beds	No. of Hospitals	No. of Beds
Seoul	1	250	1	436
Pusan	0	0	NA	NA
Kyonggi	7	890	5	1,514
Kangwon	1	80	2	1,063
Chungbuk	3	290	NA	NA
Chungnam	12	1,000	4	1,425
Chonbuk	8	630	1	630
Chonnam	11	900	2	600
Kyongbuk	10	730	5	1,565
Kyongnam	9	600	3	1,148
Cheju	2	130	NA	NA
Total	64	5,500	23	8,381
Average per Hospital	-	86	-	364

Source: Project Hospitals

Note: The number of beds in 1987 was not available at some of the project hospitals.

Table 4 shows the extent to which the project contributed to increase in the number of inpatient beds. Due to limited availability of the relevant data, the proportionate share of the number of beds at the project hospitals to the national figure is made taking the year of 1989. The number of beds at general hospitals, hospitals, and other medical institutions in the country was about 127 thousand in 1989, of which the project hospitals accounted for at least 6.6%. In some regions, project hospitals, such as the hospitals in Kangwon (18.7%) and Chungnam (17.1%), accounted for higher shares.

On the other hand, the number of inpatient beds per 100,000 persons was 301 beds on the national average. The target number of beds set for the second phase (1984-1990) of the long-term plan, 200 beds per 100,000 persons, was achieved in all the cities/provinces and the regional gap of beds was reduced to a certain extent. Taking into account the fact that the data from some of the project hospitals was not included due to limited availability of - data, it is considered that the project contributed to the earlier attainment of the goal under the long-term plan. In particular, the project was implemented against a background where the expansion of the general medical services at private hospitals was planned because the Government faced difficulties in financing the Medical Facilities Expansion Long-term Plan. The project was implemented by on-lending the Japanese ODA loan to private hospitals. This indicates that the project contributed to the earlier attainment of the planned goal by assisting the private sector to vitalize its own resources.

Table 4：Contribution of the Project in terms of the Number of Beds [Note 1)]

Unit: Beds

	No. of Beds [Note 2)]			No. of Beds per 100,000 persons [Note 3)]	
	Project Hospital (A)	Total by Region (B)	(A)/(B) (%)	Project Hospital（C）	Total by Region (D)
Seoul	436	34,795	1.3	4	337
Pusan	NA	12,795	NA	NA	344
Kyonggi	1,514	18,912	8.0	22	276
Kangwon	1,063	5,695	18.7	63	339
Chungbuk	NA	3,870	NA	NA	283
Chungnam	1,425	8,328	17.1	47	276
Chonbuk	630	4,728	13.3	29	220
Chonnam	600	12,736	4.7	16	343
Kyongbuk	1,565	12,446	12.6	31	246
Kyongnam	1,148	10,887	10.5	32	303
Cheju	NA	1,347	NA	NA	269
Total	8,381	126,539	6.6	20	301

Source: Project Hospitals and Yearbook of Health and Welfare Statistics

Note:

1) Including the number of beds at general hospitals, hospitals, and other medical institutions.

2) The data in 1987 was used for the project while the data for the whole country in 1989 was used instead of the data in 1987.

3) The number of beds per 100,000 persons was calculated based on the data on the number of beds in 1989 and the population in 1988. However, the data on the number of beds at the project hospitals was based on the data in 1987.

③Contribution of the Project in terms of the Number of Patients

The number of inpatients and outpatients at the project hospitals – a total of 33 project hospitals that responded to the questionnaires - accounted for at least 6.2% and 4.6%, respectively, of the total numbers in the country in 1987. The shares further increased in 2000 and it is estimated that the project hospitals accounted for at least 8.5% and 7.2%, respectively, of the total numbers.

Table 5：Number of Inpatients and Outpatients

	No. of Inpatients (bed-days)		No. of Outpatients (Persons)	
	1987	2000	1987	2000
Total of Project Hospitals (B)	1,820,224	3,526,403	2,811,452	6,633,206
National Total [Note1) 2)] (A)	29,386,939	41,594,326	61,773,815	91,783,781
(B)/(A)×100	6.2%	8.5%	4.6%	7.2%

Source: Project Hospitals and Yearbook of Health and Welfare Statistics

Note: 1) The statistics of the national total were from 1990 instead of 1987 and from 1999 instead of 2000.

2) The national total includes patients of communicable diseases, tuberculosis, and mental diseases.

2.4 Impact

①Impact on the Health and Medical Environment

The health and welfare statistics of the Republic of Korea reveal that the medical environment has rapidly improved over the past 30 years (Figures 1 and 2).

Figure 3 presents the daily average number of inpatients and of outpatient visits since 1975, while Table 6 compares the number of patients per population per day at the time of the appraisal (around 1977), in 1988 and 1996. The statistics show a rapid improvement during the period from the 1980s to the first half of the 1990s. This implies that more people in the country were able to receive medical services. Figure 4 shows the number of physicians per 100,000 persons by city/province in 1977, 1987 and 1995. All the regions experienced an increase of physicians, implying that the number of physicians increased in accordance with the expansion of hospital facilities. It is not possible to clearly trace the cause-and-effect relation between these statistical results and the project: however, it is understood that the project supported the process in which the country improved medical services.

Figure 1：Life Expectancy at Birth
（National Statistics） Note 1

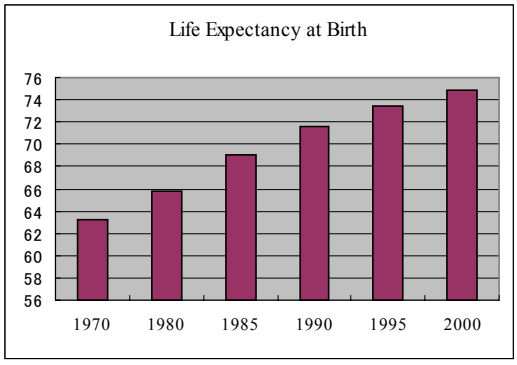
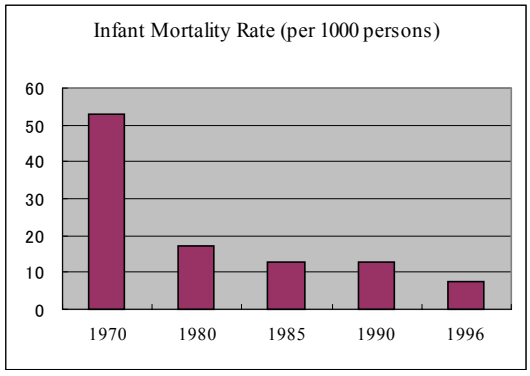


Figure 2：Infant Mortality Rate
（National Statistics） Note 2

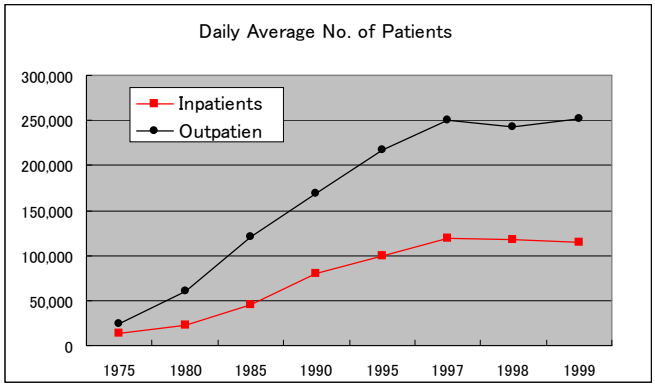


Source: Ministry of Health and Social Welfare

Note: 1) 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) The probability of dying between birth and exactly one year of age times 1000.

Figure 3：Daily Average No. of Patients [Note1)2)]



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

Note:

1) Daily average number of inpatients for "Inpatients" = Annual total number of bed-days/365 days

Daily average number of outpatients visits for "Outpatients"=Annual total number of outpatients visits/365days

2) The national total include patients of communicable diseases, tuberculosis, and mental diseases. The hospitals in the national statistics includes general hospitals, hospitals, dental hospitals, oriental medical hospitals, TB hospitals, leprosy hospitals and mental hospitals.

Table 6：Ratios of Inpatients and Outpatients
（per 1000 persons and per day）

	Inpatients	Outpatients
Appraisal time [Note1)]	0.6～1.0 person	4 persons
1988 [Note2)]	2.3 persons	17.9 persons
1996 [Note2)]	4.0 persons	31.8 persons

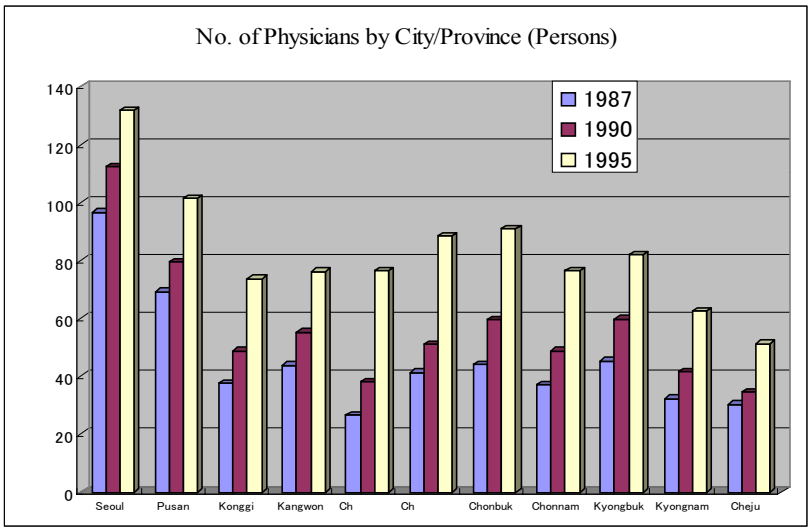
Source: Appraisal documents and Yearbook of Health and Welfare Statistics

Note:

1) The data at the time of the appraisal was from around 1977.

2)The number of inpatients and outpatients includes patients at general hospitals, hospitals, dental hospitals, oriental medicine hospitals, health centers and country hospitals, health centers, clinics, dental clinics, oriental medicine clinics, health (subcenter) centers, primary health care posts, and midwifery clinics.

Figure 4：No. of Physicians by City/Province



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

Note: The data in 1987 and 1995 is a sum of full-time and part-time physicians.

②Environmental Impact

At the three project hospitals (Songnam hospital, Songnam Chungang Hospital and Inchon Gil Hospital) where the site visits were made, private companies were commissioned to dispose medical disposes that could not be handled inside the hospitals. According to Songnam Hospital, the hospital was obliged to set up treatment facilities for wastewaters from medical tests and X-rays. The water quality was measured by a monitoring company twice a month and the results reported to the division in charge of the environment at the city. According to Songnam Chungang hospital, a government division in charge of the environment supervised private companies that handled waste materials at the hospital. Based on the results from the site visits, no specific problem was found on the environmental aspect.

2.5 Sustainability

①Operation and Maintenance

The number of physicians, para-medical staff and engineers at the hospitals which reported present conditions is shown in the following table. The number of the staff per 100 beds (average of 33 hospitals where the information was obtained) varies from hospital to hospital[5]. If the data is compared with that of hospitals in Japan, the number of physicians exceeded the average of hospitals in Japan and the number of para-medical staff was lower that the average in Japan.

[5] For example, the number of hospitals with less than 10 physicians per 100 beds was 15, the number of hospitals with 10 to 20 physicians per 100 beds was 7, and the number of hospitals with more than 20 physicians per 100 beds was 11.

Table6：No. of Staff at Respective Hospitals in 2000

Unit: Persons

	No. of Physicians Note 2	No. of Para-medical Staff Note 2	No. of Engineers Note 2
Total No. of Staff at 33 Project Hospitals Note 1	2,978	7,173	704
No. of Staff per 100 beds (Average of 33 hospitals)	19.1	46.1	4.5
Average No. of Staff per 100 at Hospitals in Japan in 1999	12	73	2

Source: Answers to Questionnaires from Respective Project Hospitals and "Heisei Year 11 Hospital Report," Homepage of the Japan's Ministry of Health, Labour and Welfare

Note:

1) The number of project hospitals that answered questionnaires

2) Physician includes Doctors, Special Doctors, Interns and Residents. Para-medical staff includes Nurses, Pharmacists and Medical Technologists. Engineers include Engineering Technicians, Bioengineering Staff who handle maintenance of equipment and facilities but administrative staff are not included.

3) Japan's statistics were from 1999. The hospitals have capacity for more than 20 inpatients and the data excludes data from mental hospitals and sanatoriums for TB.

As for the operation and maintenance of the equipment at Songnam Hospital after the completion of the project, minor repair works were done by engineers at the hospital but repair works requiring higher skills and maintenance of CT (Computerized Tomography), etc. was carried out under the maintenance contracts with external agencies. At Songnam Chungang Hospital, minor repair works were handled inside the hospital.

②Financial Conditions

19 hospitals reported their financial conditions for the year of 1987 and 33 hospitals for the 2000, in response to the questionnaire prepared for this evaluation. Out of these, the number of hospitals that recorded losses was 6 (6 hospitals / 19 hospitals=32%) in 1987 and 14 (14 hospitals / 33 hospitals = 42%) in 2000. Many of the hospitals faced financial difficulties.

According to the executing agency, although the project hospitals in medically weak areas contributed to reduce regional gap in the quality of medical service and played the role of core hospital in the regions, some hospitals have experienced financial deterioration because of: a decrease in the demand for medical services; difficulties in securing medical staff and equipment/facilities; increased burdens of the loan repayment due to the appreciation of the yen currency compared with the exchange rate at the time of loan disbursement, etc. In some cases, the Government financially assisted hospitals in their expansion of building, repairs, and enhancement of the equipment with the policy-based funds. Still in 2001, the Government extended its assistance to some of the hospitals in the form of policy-based loans.

It is evaluated that at the time of this evaluation, some project hospitals were experiencing financial difficulty due to environmental changes such as excessive competition among medical institutions[6], institutional reforms like the separation of prescribing and dispensing medicine, a slow adjustment in response to the transition to an aging society, and an increase in debt burdens arising out of the yen's appreciation.

When this evaluation was conducted, fourteen years had already passed since the project completion. Therefore, some of the equipment procured through the Japan's ODA loan had already been disposed of.

[6] The number of beds per 100,000 persons in 1997 was 480 beds in the ROK. This exceeds the levels in Canada, UK and USA (refer to Figure 2 above). The health and medical environment in the country has drastically changed from the conditions 20 years ago when the appraisal was conducted. The executing agency (Ministry of Health and Welfare) considered that the current supply of the medical services was at a high level. It recognized that it may be rather excessive.

Among the project hospitals, some went into bankruptcy while others underwent reorganization, for example, being merged into another hospital. The project was implemented in the early stage of the establishment of a nation-wide supply system of medical services in the ROK. It is evaluated that the project has already fulfilled its role.

Comparison of Original Plan and Actual Scope

Item	Plan	Actual
1. Project Scope	Procurement of medical equipment at 64 private regional hospitals	Procurement of medical equipment at 53 private regional hospitals
2. Implementation Schedule	October, 1980～December, 1982	October, 1980～December, 1986
2. Project Cost		
Foreign Currency	13,000 million yen	12,441 million yen
Local Currency	27,400 million yen	NA
（Local Currency in Won）	（71,500 million won）	（NA）
Total	40,400 million yen (Note)	NA
ODA Loan Portion	13,000 million yen	12,441 million yen
Exchange Rate	1won＝0.38yen （September, 1980）	1won＝0.30yen （Average of 1980～1986）

Source: JBIC Documents and the Executing Agency

Note: Excluding the cost for the land acquisition