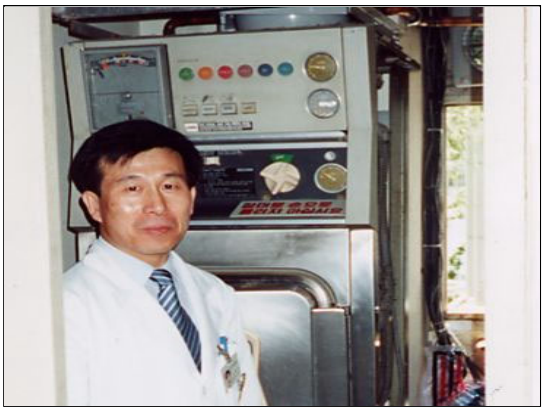
Korea

Medical Facilities Expansion Project

Report Date: March 2002
Field Survey: July 2001

1. Project Profile and Japan's ODA Loan

Site Map：48 hospitals throughout the country



Site Photo：Sterilizer procured under the project (Pusan Paik Hospital)

1.1 Background

At the time of appraisal in 1978, the Republic of Korea (ROK) lagged behind Japan in terms of the medical facilities. The number of beds per 100,000 population was fewer than that in Japan and the situation in regional areas was left behind that in Seoul-si and Busan-si. Although medical laws in ROK required the similar quality standards for medical equipment and facilities conditions as in Japan, quality of medical service was substantially lower, particularly at municipal and provincial hospitals, due to the obsolescence of equipment and facilities.

The Government of the ROK planned to improve and modernize medical equipment and facilities with the aim of meeting potential medical demands, which were emerging due to the effort to enhance medical security system such as medical insurance and medical aid, since 1977. An immediate target was to increase the number of inpatient beds to 165 beds per 100,000 population by 1983. For the first phase to achieve this goal, the Government, under the fourth five-year development plan (1977-1981), decided to implement the Medical Facilities Expansion Project with particular emphasis on regional areas. The project required a total of 67.3 billion won (equivalent to 30.6 billion Japanese yen with the target number of additional beds being 6,820 beds). This Japanese ODA -assisted project was implemented as part of the above nationalproject, accounting for 74% (5,050 beds) of the total target number of beds and 70% of the total project cost.

1.2 Objectives

The project aimed at increasing and modernizing medical equipment and facilities, in order to cope with the increasing demand for medical services.

1.3 Project Scope

Construction was planned for five (5) new hospitals in industrial complexes, five (5) new hospitals in medically weak areas, and six (6) new municipal/provincial hospitals, and extension / reconstruction was planned for thirty-two (32) existing municipal/provincial hospitals[1]. Japan's ODA loan was to be utilized for the procurement of medical equipment necessary for the 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	7,000 million yen 6,833million yen
Date of Exchange of Notes Date of Loan Agreement	December, 1978 December, 1978
Teams and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 3.5% 20 years（7 years） General untied
Final Disbursement Date	December, 1984

2. Results and Evaluation

2.1 Relevance

The project was undertaken as part of the Medical Facilities Expansion Long-term Plan (1980-2000) in order to expand medical equipment and facilities and was based on the fourth five-year development plan. The number of beds per 100,000 population (excluding those at clinics, etc.) in 1978 was 85 beds[1] on the national average, but there were large differences among regions within the country and this number lagged far behind the levels of other developed countries. Against this background, the project plan, aiming at the establishment of a regionally-balanced medical supply system throughout the country, was evaluated as relevant.

Table 1 compares the number of beds at general hospitals and hospitals among the respective cities and provinces before and after the project. In 1984 when the project was completed, the nation-wide average number of beds was 168[2] per 100,000 population, already exceeding 165 beds per 100,000 population, which was the target for the first phase of the long-term plan. However, differences among the regions remained large. Table 2 compares the number of beds per 100,000 population at medical institutions, including clinics, etc., with that of other developed countries. The level in 1985 still shows a large difference from that of other developed countries. The project plan was still relevant at the time of the project completion.

[1] The data was from general hospitals (capable of hospitalizing more than 80 inpatients at the time of the appraisal) and hospitals (capable of hospitalizing more than 20 inpatients at the time of the appraisal). The data from clinics and others was not included. If all the medical institutions including clinics, etc. were taken into account, the number of beds per 100,000 persons would be 142 as of the end of 1978.

[2] The number of beds at all medical institutions including clinics, etc. was 229 beds per 100,000 persons in 1984. This calculation was made by dividing the number of beds in 1984 with the population in 1985 (due to the limited availability of _ data).

Table 1 : Number of Beds per 100,000 Persons by Region

Unit : Beds

City/ Province	1978	1984	1999
Seoul	184	221	379
Pusan	119	197	392
Kyonggi	59	150	243
Kangwon	56	160	545
Chungbuk	30	108	322
Chungnam	43	126	323
Chonbuk	43	102	354
Chonnam	65	182	361
Kyongbuk	61	127	328
Kyongnam	49	170	387
Cheju	38	171	288
National Average	85	168	338

Table 2 : Number of Beds per 100,000 Persons by Country

Unit : Beds

Country	1985	1990	1997
Australia	1,090	-	830
Canada	670	620	470
France	1,050	970	850
Germany	1,100	1,040	940
Italy	850	720	590
Japan	1,470	1,600	1,640
Korea	240	310	480
UK	740	590	430
USA	550	490	390

Source: The statistics for 1978 in Figure 1 were from JBIC Appraisal Documents and the rest were from Yearbooks of Health and Welfare Statistics, Ministry of Health and Welfare.

Note:

1) The statistical basis of the data in Figures 1 and 2 is different. The number of beds in Figure 1 is a sum of beds at general hospitals and hospitals. On the other hand, the number of beds in Figure 2 includes those at clinics, etc. in addition to beds at general hospitals and hospitals.
2) Due to the limited availability of actual data for 1978 and 1984, the figures in 1978 were calculated with the number of beds by region in 1978 and the population by region in 1977, and the figures in 1984 were calculated using the number of beds by region in 1984 and the population by region in 1985.

2.2 Efficiency

2.2.1 Project Scope

The following compares the planned number of project hospitals with the actual by the type and area. The number of project hospitals was 48 and this was same, although the composition changed. Out of these, the number of hospitals confirmed during the post-evaluation was ten (10) hospitals in industrial complexes, ten (10) hospitals in medically weak areas, and twenty-four (24) city/provincial hospitals. Out of the forty-four hospitals identified, three hospitals in medically weak areas had been already closed.

Table 3 : Comparison between Planned and Actual Number of Project Hospitals

Unit: Hospitals

Category	Plan	Actual
New construction of hospitals in industrial complexes	5	10
New construction of hospitals in medically weak areas	5	11
New construction of municipal/provincial hospitals	6	27
Extension/reconstruction of municipal/provincial hospitals	32	
Total	48	48

Source: Appraisal Documents and Project Completion Report

As for the reason behind the change in the composition of the project hospitals, the number of hospitals in industrial complexes and medically weak areas increased because it was considered necessary to extend financial assistance to these hospitals based on the government policy to strengthen them. On the other hand, in the case of municipal/provincial hospitals, the number decreased because eleven (11) hospitals came to receive financial assistance from other sources (municipal/provincial governments).

It was planned that a total of 19,695 units and 772 types of equipment was to be procured under the project. It was impossible to collect comprehensive data on the medical equipment procured because at the time of the post-evaluation 17 years had already passed since the project completion. At Pusan Paik Hospital, a newly constructed hospital in an industrial complex, where a case study was conducted during the site survey, 66 sets of medical equipment were introduced under the project. Out of these, twelve sets of equipment such as sterilizers, operating laparoscopes and operating laryngoscopes were still being utilized.

2.2.2 Project Cost

Almost all the foreign currency portion (ODA portion), 98%, of the project cost was disbursed. The data on the local currency portion for the municipal/provincial hospitals was not available. As for the private hospitals in industrial complexes and medically weak areas, the actual cost amounted to 25,430 million won as against the planned estimate of 6,840 million won (including contingencies). When the unit cost per hospital basis is compared, the actual cost is about 1.7 times as large as the planned. It is considered that the reason for the cost overrun was due to an increase in unit construction prices[3]. The project hospitals coped with the cost overrun by receiving financial assistance from the government as well as using internal funds.

2.2.3 Implementation Schedule

The project started from January 1978 and was completed in December 1984, three years behind the original completion schedule. The reasons behind the delay of the schedule vary from delays in concluding purchasing contracts to changes in some of the project hospitals, and delays in construction and equipment procurements. Most of the new hospitals opened in the period from 1981 to 1983.

2.3 Effectiveness

① Utilization of Equipment Procured

As it was difficult to carry out survey on the current conditions of all the equipment procured under the project at this stage, a comprehensive examination of the utilization of the equipment is not available. According to the site survey, out of 66 sets of medical equipment had been procured at Pusan Paik Hospital, twelve sets of the equipment such as sterilizers, operating laparoscopes and operating laryngoscopes were still being utilized. At Inchon Gil Hospital, the mammography X-ray examination equipment procured in 1983 was still being utilized.

② Contribution of the Project to the Increase of the Number of Inpatient Beds

As for the contribution of the project to increasing the number of inpatient beds at the time of the project completion in 1984, the number of beds increased at least by 4,874 beds[4] at the project hospitals[5]. Since

[3] The average yearly increase of the consumer price index during the project implementation period from 1978 to 1984 was 13.6%. Particularly from 1978 to 1981, the rate of the increase was as high as 20.6%. At the time of the project appraisal, the project cost was estimated with the consideration of a 10% annual increase in the prices of the local currency portion including 10% physical contingencies. The actual cost, however, exceeded this estimate.

[4] Out of which, 2,281 beds were put into use at hospitals in industrial complexes. This number accounted for 47%of the total number of beds at the project hospitals in 1984.

[5] The data concerning the number of beds was not sufficient at many of the project hospitals, as time had passed. In addition, the administrative boundaries were different from those which existed at the time of the appraisal. Therefore, it was not possible to

the project aimed to add 5,050 new beds, accounting for 74% of 6,820 beds (the target number of beds under the fourth five-year plan), this means that 97 % (=4,874 beds/5,050 beds x 100) of the target of the project was achieved. Furthermore, the sum of beds at general hospitals and hospitals numbered 68.3 thousand in 1984, of which the number of beds at the project hospitals accounted for at least 7.1%. In terms of regional distribution of the beds, project hospitals accounted for higher shares in the Province of Kangwon (24.5 %), Chonbuk (22.2%) and Chungnam (20.2%).

Furthermore, in order to examine the extent to which the project actually contributed to the target (165 beds per 100,000 population) [6] under the first phase (1980-1983) of the Medical Facilities Expansion Long-term Plan, the following calculation has been made. Firstly, the number of beds required to achieve the planned figure was calculated based on the population (Column (C) in Table 4). Secondly the difference between the planned number of beds required to achieve the target and the existing number of beds before the project was regarded as the number of beds that fell short of the target (Column (D) in Table 4). Finally, an analysis was made to examine achievement ratio of the first phase target of the long-term plan in 1984 ((B)/(C) in Figure 4) and also the contribution the project made to reduce the shortage ((A)/(D) in Table 4).

The target of the first phase long-term plan was achieved on the basis of the country average. However, in terms of achievement by region, Chungbuk and Chonbuk attained about 60 % of the target while Chungnam and Kyongbuk managed about 70% of the target. In Chonbuk and Chungnam, however, as the project hospitals provided more than 25% of the number of beds short in the provinces, based on the above calculation, the contribution made by the project was evaluated to be even more considerable. As overall contribution of the project, the project hospitals provided at least 13% of the number that was calculated to be short of the target. In Kangwon and Pusan, the project hospitals provided 66% and 33%, respectively, of what was considered to be short.

Table 4：Contribution of the Project in terms of the Number of Beds

Unit : Beds

Year	Number of Beds in 1984			Achievement of the Long-term Plan as of 1984			
City/Province	Project Hospitals (A)	Total Hospitals (B) Note 1)	(A)/(B) (%)	No. of Beds required to achieve the Target Note2) (C)	No. of Beds short of Target Note3) (D)	Achievement of the Target (B)/(C) (%)	Contribution made by the Project to reduce the Shortage (A)/(D) (%)
Seoul	NA	21,486	-	16,045	7,653	133.9	-
Pusan	953	7,032	13.6	5,882	2,930	119.5	32.5
Kyonggi	160	9,330	1.7	10,289	6,967	90.7	2.3
Kangwon	680	2,780	24.5	2,871	1,036	96.8	65.6
Chungbuk	NA	1,511	-	2,315	1,417	65.3	-
Chungnam	770	3,814	20.2	4,995	2,827	76.4	27.2
Chonbuk	500	2,257	22.2	3,666	1,909	61.6	26.2
Chonnam	396	6,891	5.7	6,240	3,341	110.4	11.9
Kyongbuk	615	6,437	9.6	8,392	5,207	76.7	11.8
Kyongnam	800	5,983	13.4	5,821	3,608	102.8	22.2
Cheju	NA	842	-	813	472	103.5	-
Total	4,874	68,363	7.1	67,330	37,368	101.5	13.0

Source: JBIC Appraisal Documents, Data from the Respective Project Hospitals, Yearbook of Health and Welfare Statistics

Note:

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make an analysis based on accurate data.

[6] It is assumed that the target number of beds was a sum of those at general hospitals and hospitals.

1) The nation-wide statistics shows the sum of beds at general hospitals and hospitals.

2) The planned number of beds was calculated based on the target set under the first phase (1980-1983) of the Medical Facility Long-term Plan (1980-2000), which was 165 beds per 100,000 persons (=(165 beds x population in 1985)/100,000 persons). As the statistics for the population in 1984 were not available, the population in 1985 was used as an alternative.

3) The number of beds that was short of the target was calculated as the difference between the number of beds necessary to achieve the target and the existing number of beds before the commencement of the project.

③Contribution of the Project to the Improvement in Medical Services to Patients

In terms of the number of inpatients received medical service at the project hospitals, it is calculated that the project hospitals accounted for at least 6.4 % of the total number of inpatients, and for 9.1% of the total number of outpatients visits in 1984, the year in which the project was completed. The share in 2000 slightly decreased but showed comparable contributions.

Table 5：Contribution of the Project in terms of the Number of Patients

	No. of Inpatients (Bed-Days)		No. of Outpatients Visits (Persons)	
	1984	2000	1984	2000
Total of Project Hospitals (B)	1,065,853	2,282,288	4,006,844	7,461,318
National Total [Note] (A)	16,358,225	41,594,326	43,829,683	91,783,781
(B)/(A)×100	6.5%	5.4%	9.1%	8.1%

Source: Project Hospitals and Yearbooks of Health and Welfare Statistics

Note:

1) The statistics for the national total were from 1985 instead of 1984 and from 1999 instead of 2000.

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

2.4 Impact

①Impact on the Health and Medical Environment

Health and welfare statistics in the Republic of Korea show that the medical environment improved rapidly 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 day at the time of the appraisal (around 1977), in 1988 and 1996. The statistics show a rapid improvement during the period. This implies that more people in the country were able to receive medical services. Figure 4 shows the number of physicians per 100,000 population at municipal/province in 1977, 1987 and 1995. All the regions experienced an increase in 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 its medical services.

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

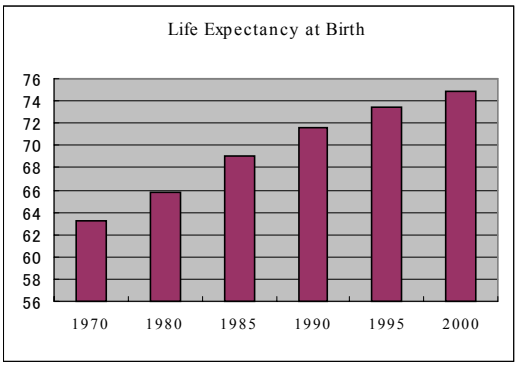
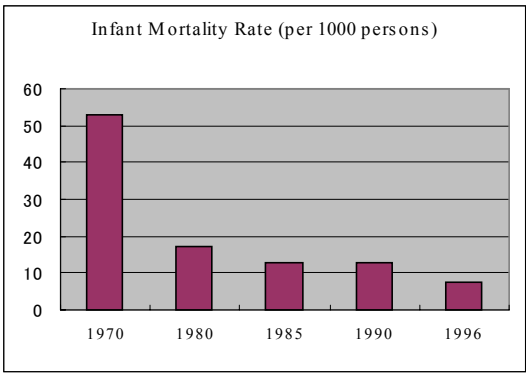


Figure 2：Infant Mortality Rate (National Statistics) [Note 2]



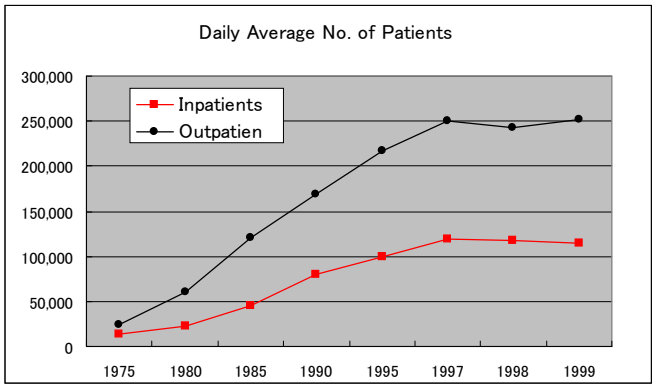
Source: Ministry of Health and Social Welfare

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 includes patients of communicable diseases, tuberculosis, and mental diseases. The hospitals in the national statistics include 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

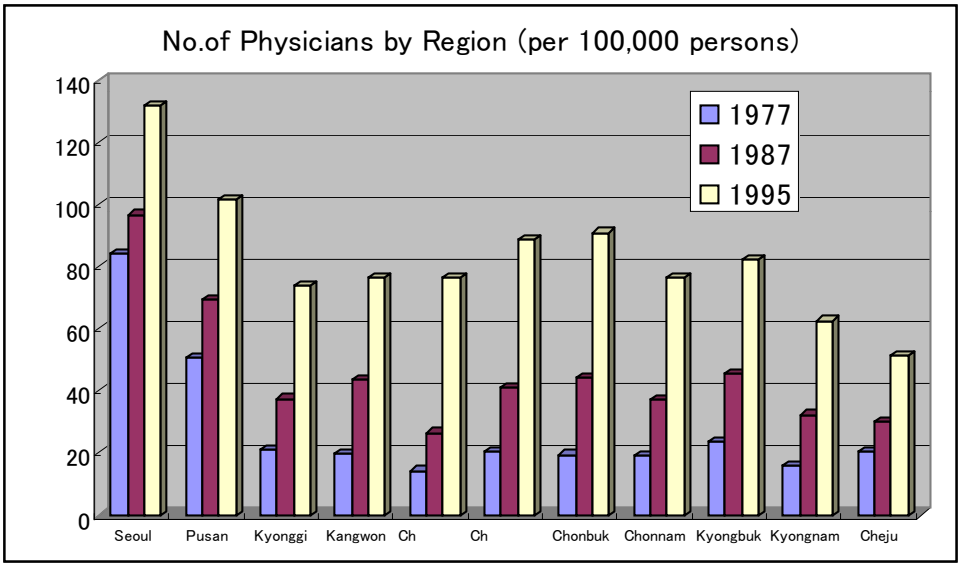
Note:

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 center and country hospitals, health centers, clinics, dental clinics, oriental medicine clinics, health (subcenter) centers, primary health care posts, and midwifery clinics.

Figure 4：Number of Physicians by Municipal/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 National Medical Center in Seoul where the site visit was conducted at this evaluation, accredited companies that had met environmental standards were commissioned to dispose medical disposals that might carry the risk of infection (gauze, internal organs, needles, etc.). At Pusan Paik Hospital, it was reported that they disposed them in accordance with the laws and regulations. At Inchon Gil hospital, an incinerator was installed at the hospital but private companies handled waste materials that could not be processed inside the hospital in consideration of environmental impacts, etc.

2.5 Sustainability

① Operation and Maintenance (O&M)

The respective project hospitals have been carrying out operation and maintenance of project facilities. The number of staff at the project hospitals that reported their current personnel status is summarized by type as in the following table. As regard to the number of staff per 100 beds, the number of physicians at hospitals in industrial complexes well exceeded Japan's statistics, while the number of para-medical staff was fewer than Japan's average. The number of physicians at municipal/provincial hospitals was nearly same as the Japan's average, but the number of para-medical staff was fewer. The number of physicians, para-medical staff and engineers at hospitals in medically weak areas was fewer than the number at other types of hospitals. This particularly applies to the number of physicians.

Table 7：No. of Staff at Respective Hospitals in 2000

Unit: Persons

	No. of Hospitals (Site) Note1	Total No. of Beds (Average No. of Beds/Hospital (Beds)	No. of Physicians (per 100 beds) Note 2	No. of Para-medical Staff (per 100 beds) Note 2	No. of Engineers (per 100 beds) Note 2
New hospitals in industrial complexes	10	6,612 (661)	1,865 (28)	3,872 (59)	534 (8)
New hospitals in medically weak areas	6	2,408 (401)	95 (4)	528 (22)	59 (2)
New municipal/provincial hospitals	24	5,822 (243)	742 (13)	2,433 (42)	227 (4)
Extension and reconstruction of existing municipal/provincial hospitals					
Total	40	14,842 (371)	2,702 (18)	6,833 (46)	820 (6)
Hospitals in Japan Note 3			(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 the personnel status in the 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 is not included.

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

② Financial Conditions

Thirty-seven (37) project hospitals answered questionnaires prepared for this evaluation about their financial conditions. Out of these, hospitals that recorded losses in the financial year 2000 numbered 18 and, in particular, many municipal/provincial hospitals experienced negative profits. One of the reasons behind the less profitable operations may be the stronger orientation of the municipal/provincial hospitals towards public welfare, compared with private hospitals. The Busan Medical Center, where a site visit was conducted, pointed out reasons behind the decrease of the medical revenues in 2000, such as the decrease of revenues from outpatients due to the separation of prescribing and dispensing of medicine, and the decrease of revenues from inpatients due to the obsolescence of facilities. Pusan Paik Hospital in the industrial complex explained that the number of factories significantly decreased due to their relocation overseas. Thus, the considerable change in the social and economic environment from the appraisal time is another factor which explains the existing financial conditions. The executing agency (Ministry of Health and Welfare) understood that the condition of medical service at present was at a high level. It recognized that it may be rather over-supply. Although the situation varies from region to region, the excessive supply of medical services[7] is also regarded as a reason behind the difficult conditions in operating the hospitals.

[7] As shown in Table 2 above for the comparison with other developed countries in 1997, the number of beds in the ROK already exceeded the levels of Canada, UK, and USA.

Table 8：Financial Conditions at Respective Hospitals in 2000

Unit: Hospitals

	No of Hospitals answering the Questionnaires	No. of Hospitals that recorded losses in 2000
New hospitals in industrial complexes	9	3
New hospitals in medically weak areas	4	0
New city/provincial hospitals	24	15
Extension and reconstruction of existing city/provincial hospitals		
Total	37	18

Source: Respective Project Hospitals

When the post-evaluation was conducted, seventeen years had already passed since project completion. Therefore, some of the equipment procured under the projecthad already been disposed. However, many newly constructed or extended/reconstructed hospitals were still providing medical services. Nearly half of the hospitals from which financial data was collected at the time of the post-evaluation experienced financial losses in 2000. However, it would be inappropriate to question the sustainability of the project hospitals with only this information at hand. The project was implemented in the early stages of the establishment of a nation-wide supply system of medical services in the ROK. It is considered that the project has fulfilled its role.

Comparison of Original and Actual Scope

Item	Plan	Actual
1. Project Scope New hospitals in industrial complexes New hospitals in weak areas New city/provincial hospitals Extension and reconstruction of existing city/provincial hospitals	5 hospitals 5 hospitals 6 hospitals 32 hospitals	10 hospitals 11 hospitals 27 hospitals
2. Implementation Schedule	January, 1978～December, 1981	January, 1978～December, 1984
3. Project Cost Foreign Currency Local Currency （Local Currency in Won） Total ODA Loan Portion Exchange Rate	7,000 million yen 14,405 million yen （31,691 million won） 21,405 million yen 7,000 million yen 1won＝0.45yen （ 1978）	6,833 million yen None （25,430 million won） Note None 6,833 million yen 1won＝0.36yen （Average of 1978～1984）

Source: JBIC Documents and Reports from the Executing Agency

Note: Sum of the local costs for hospitals in industrial complexes (total of 16,840 million won for 10 hospitals) and for hospitals in medically weak areas (total of 8,590 million won for 11 hospitals). The local cost portion of the project costs for city/provincial hospitals was not available.