People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project

"Public Health Project (Henan Province)"

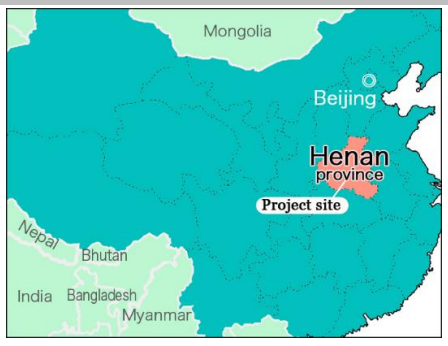
External Evaluator: Takako Haraguchi, International Development Center of Japan Inc.

0. **Summary**

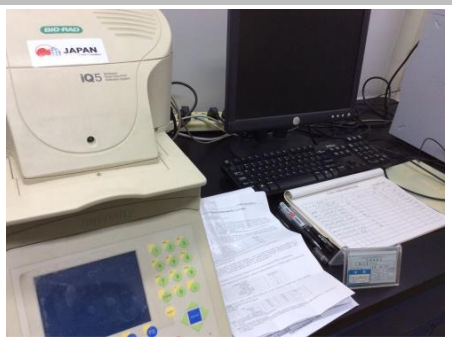
This project was to develop the facilities, equipment, and the human resources of the core organizations related to infectious disease control in Henan Province; namely, Centers for Disease Control (CDCs), infectious disease hospitals (IDHs) and emergency centers. This was performed with the objective of strengthening control of infectious diseases in the province as part of China's efforts to improve public health infrastructures that had been accelerated since the outbreak of severe acute respiratory syndrome (SARS) in 2002. The relevance of the project's implementation was high as the project's objective was consistent with China's development policies and development needs for improving its public health service system, including upgrading its infectious disease control capabilities. The project's efficiency was evaluated to be fair because, while the project cost was within the planned expenditure, the project period significantly exceeded the timetable, mainly due to delays in the procurement of equipment. The project's effectiveness and impact were evaluated to be high as it was observed that the target institutions had strengthened their respective capacities, specifically: (i) CDCs improved their testing and networking for infectious disease control; (ii) IDHs improved their ability to accept patients as well as their level of testing and treatment; and (iii) emergency centers improved their ability to promptly respond to emergency cases. Furthermore, through improved coordination among these institutions, integrated response to infectious diseases, e.g., occurrence of a disease, identification, transportation, and treatment, was strengthened and, thus, contributed to a reduction in the case fatality rate of infectious diseases in Henan Province. The sustainability of the project's effects was also evaluated to be high, as there were no serious problems in relation to the institutional, technical, and financial aspects, nor with regard to the current operation and maintenance status of the developed facilities and equipment.

In light of the above, this project is evaluated to be highly satisfactory.

1. **Project Description**



Project Location



A device for genetic testing and the usage record. This device was most useful in examinations of viruses. (Henan Province CDC)

1.1 Background

In China, total incidences of diseases defined by law as infectious had decreased since the mid 1980s, but, due to emerging infectious diseases such as AIDS and public health problems in rural areas, infectious disease control remained an important issue. It was under such circumstances that SARS occurred in November 2002 and rapidly spread. Consequently, this outbreak exposed the vulnerability of China's public health infrastructures; for example, its lack of an information network or warning system related to infectious diseases, the aging of some medical equipment and devices, a shortage of medical personnel in both quantitative and qualitative terms, and a shortage of investment funds.

In response to such a situation, the Chinese government developed national master plans to improve public health infrastructures. First, the Construction Plan of Disease Prevention and Control System aimed to strengthen the disease control system at the local government level by promoting the reinforcement of facilities/equipment and the training of the CDC[1] personnel. By the end of 2002, CDCs had been established in 3,580 locations at provincial, prefecture, and county levels across the country. Second, the Construction Plan of Medical Treatment System to Cope with Public Health Emergency aimed to develop emergency treatment networks for enhancing the management of and emergency treatment capacity for addressing sudden public health events such as outbreaks of infectious diseases, incidences of unknown diseases, mass epidemics of serious food poisoning, etc., by establishing emergency centers, infectious disease hospitals (or wards) and intensive care units (ICUs) in municipalities, provincial capitals, and prefecture-level cities nationwide.

This project targeted Henan Province, one of the eleven provinces in Central China where the largest population resided and concessional funds were particularly required[2].

1.2 Project Outline

The objective of this project was to strengthen infectious disease control in Henan Province by developing the facilities and equipment of basic institutions related to public health and by training personnel involved in infectious-disease control at provincial-level and prefectural-level cities, thereby contributing to the improvement of the health status of local residents.

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[1] A CDC is an organization in charge of public health administration that has similar functions to a health center and the public health institutes of Japan. The major tasks of a CDC include the prevention and management of serious diseases (e.g., pathogen analysis and monitoring), immunization, and food hygiene supervision. Institutionally, each of the central governments, provinces, prefectures, and counties has a CDC. A system had been in place in which information on infectious diseases collected at each CDC was sent to the central CDC. However, at the outbreak of SARS, it was heard that such a system did not fully function due to a lack of "hardware" and "software" and insufficient financial input from the Government of China (JICA documents at the time of appraisal).

[2] This project is one of the Japanese ODA Loan projects titled "Public Health Project" that were implemented in ten central provinces (i.e., all of the eleven central provinces except Hainan Province). The Loan Agreements were signed in 2004. In the other areas of China, similar measures to those supported under this project were to be basically implemented, using provinces' own funds in conjunction with subsidies from the central government in the coastal areas with notable economic development, and using loans from the German government combined with subsidies from the central government in the western areas.

Loan Approved Amount/ Disbursed Amount	5,016 million yen / 4,635 million yen	
Exchange of Notes Date/ Loan Agreement Signing Date	March, 2004 / March, 2004	
Terms and Conditions	Interest Rate	1.5%
	Repayment Period	30 years
	(Grace Period)	(10 years)
	Conditions for Procurement:	General Untied
Borrower / Executing Agency	The government of the People's Republic of China / Henan Provincial People's Government	
Final Disbursement Date	August, 2012	
Main Contractor (Over 1 billion yen)	None	
Main Consultant (Over 100 million yen)	None	
Feasibility Studies, etc.	F/S: "Feasible Research Report: Henan Public Health Infrastructures Construction Japanese-Yuan Loan Project," Henan Engineering Consulting Company, August, 2003.	
Related Projects	Training for Japanese ODA Loan Public Health Project (Henan Province) (Technical Assistance Related to ODA Loans, 2012–2013)	

This project targeted a total of 53 institutions, including CDCs, IDHs,[3] and emergency centers in the province along with all of the 18 prefecture-level cities (Zhengzhou, Kaifeng, Luoyang, Pingdingshan, Anyang, Hebi, Xinxiang, Jiaozuo, Puyang, Xuchang, Luohe, Sanmenxia, Shangqiu, Zhoukou, Zhumadian, Nanyang, Xinyang, and Jiyuan. See "3.2.1 Project Outputs" for details).

To implement the project, the Henan Provincial People's Government established the "Provincial Leader's Group for the Project," which included the Vice Governor assuming the role of Executive Director and consisting of top officials from the Financial Department, the Development and Reform Commission, and the Provincial Health and Family Planning Commission (PHFPC; known as the Health Department at the time of the commencement of the project). Under this, the Provincial Project Executive Office was established within the PHFPC. The Prefectural Project Executive Office established in each prefecture-level city assumed practical-project-implementation tasks at each of the

[3] Including Infectious Disease Departments of general hospitals.

53 institutions (i.e. subprojects). The information referred to in this report as "responses from the executing agency" was provided, unless otherwise mentioned, by the Financial Department and the PHFPC. Responses from agencies that implemented individual subprojects are described as "responses from the targeted institutions" or similar.

2. **Outline of the Evaluation Study**

2.1 External Evaluator

Takako Haraguchi, International Development Center of Japan Inc.

2.2 Duration of Evaluation Study

Duration of the Study: August 2014 – January 2016

Duration of the Field Study: November 23 – December 12, 2014 and March 9 –13, 2015[4]

3. **Results of the Evaluation (Overall Rating: A[5])**

3.1 Relevance (Rating: ③[6])

3.1.1 Relevance to the Development Plan of China

This project is consistent with China's development policies, as the development of the health service system, including the improvement of the capacity to handle infectious diseases, was an important issue in the national development plans and the health sector development plans of Henan Province, both at the time of appraisal and at the ex-post evaluation. First, regarding the national development plans, at the time of appraisal the 10th Five-year Plan for National Economic and Social Development (2001–2005) set an aim of "controlling and monitoring infectious diseases and endemic diseases, etc., by reinforcing emergency and disease prevention systems in urban areas." The national master plans mentioned in "1.1 Background" above were in line with this aim. At the time of the ex-post evaluation, the 12th Five-year Plan for National Economic and Social Development (2011–2015) states that to achieve its objective, namely to "improve the basic health care system," the plan will "strengthen the building of a public health service system" by implementing "major public health projects, strengthening the prevention and control of major communicable diseases as well as chronic, occupational, endemic and mental illness, and enhancing our capacity to respond to public health emergencies."

Next, regarding the health sector development plans of Henan Province, at the time of appraisal the 10th Five-year Plan for Health Sector Development in Henan Province (2001–2005) concerned public health issues such as the strengthening of the disease prevention system, the development of a hygiene control system, the strengthening of the information networks and surveillance systems,

[4] As the number of targeted institutions was large, the evaluators could not visit all of them. Nevertheless, a questionnaire was distributed to every institution for the collection of quantitative data. Genuine responses were obtained from 47 of the 53 individual targeted institutions. Brief information on the institutions that did not provide specific answers was obtained from the executing agency (Financial Department and PHFPC). Visits were made to 17 targeted institutions, the provincial CDC, six prefecture-city CDCs, five IDHs, and five emergency centers in five municipality/prefecture level cities.

[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[6] ③: High, ② Fair, ① Low

etc. At the time of the ex-post evaluation, the 12th Five-year Plan for Health Sector Development in Henan Province (2011–2015) had been introduced. This aimed at the standardization of or meeting the national standard of disease prevention and control in terms of number of personnel, infrastructure, and equipment, etc.; strengthening the laboratory network; strengthening the surveillance and emergency response system for major infectious diseases; the development of specialized medical facilities such as IDHs; the development of an emergency medical system; etc.

The aims of this project, i.e., development of the facilities/equipment and human resources of CDCs, IDHs, and emergency centers, are all included in these important issues.

3.1.2 Relevance to the Development Needs of China

This project is mostly consistent with China's development needs. At the time of appraisal, the public health infrastructures and systems for responding to infectious diseases (information networks) were weak and, thus, required strengthening. In Henan Province, by the time of the ex-post evaluation, CDCs had been established at provincial level and in all of the 18 prefecture-level cities and 158 counties, six of 18 prefecture-level cities had hospitals that specialize in infectious diseases, and emergency centers were present in 10 prefecture-level cities. Construction of emergency centers is also in progress at county level. The importance of these institutions remains high as they have already played public health-related roles in their respective regions.

Incidences and the mortality rate of diseases defined by law as infectious fluctuate in both China and Henan Province (Table 1). Both the incidences and mortality rate of viral hepatitis and AIDS in Henan Province are higher than the national average. Also, while not mentioned in the table, there were outbreaks of the new influenza (H1N1) in 2009 and in 2013, the human avian influenza (H7N9), and emergent occurrences of some other infectious diseases[7]. These show the constant need to be prepared for such epidemics.

In addition, a small number of the targeted IDHs and emergency centers commented that infection does not always occur and, thus, the equipment procured under this project is also in high demand for examination, diagnosis, and emergent responses related to non-infectious diseases. It is considered that this opinion does not lessen the need for infectious disease control.

[7] Emergent infection cases in Henan Province include salmonella (2012) and dengue fever (2013). Regarding emerging infectious diseases, the new influenza (H1N1) became epidemic in 2009 and 2013 and the human avian influenza (H7N9) in 2013. Total cases of incidence of emerging infectious diseases are as follows: 1,230, 242, 0 for the new influenza and 0, 4, 0 for the avian influenza in 2009, 2013, and 2014, respectively (source: responses from the executing agency).

Table 1: Incidence and mortality rate of major infectious diseases

(Unit: Number of cases per 100,000 people)

		Designated infectious diseases*		Viral hepatitis		Pulmonary tuberculosis		Dysentery		Gonorrhea		Measles		AIDS	
		2002	2014	2002	2014	2002	2014	2002	2014	2002	2014	2002	2014	2002	2014
Incidence	China	180.14	207.17	66.10	95.45	43.58	66.79	36.23	13.93	13.28	7.36	4.76	2.04	0.06	3.12
	Henan Province	318.5 (2005)	195.06	81.11	118.97	38.32	67.06	35.31	18.71	4.36	2.88	2.64	0.88	2.86	3.40
Mortality Rate	China	0.35	0.11	0.08	0.05	0.08	0.19	0.02	0.00	0.00	0.00	0.01	0.00	0.02	0.84
	Henan Province	1.06 (2005)	1.27	0.22	0.06	0.02	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.62	1.71

Sources: JICA documents; responses from the executing agency; China Health Statistical Yearbook 2010.

Note: In 2002, "designated infectious diseases" consisted of 26 Class A and Class B diseases from a total of 35 diseases (in descending order according to hazardous nature: two Class A, 24 Class B, and nine Class C) defined in the Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases (enforced in September 1989). In 2014, "designated infectious diseases" consisted of 28 Class A and Class B diseases from a total of 39 diseases (two Class A, 26 Class B, and 11 Class C) defined in an amendment to the law mentioned above (enforced in December 2004; revised in 2013). In the 2004 amendment to this law, SARS and human avian influenza (H5N1 and H7N9) were added as Class B diseases. In 2009, the new influenza (H1N1) was added as a Class B disease. In the 2013 revision to this law, H1N1 was changed to a Class C disease. The individual diseases mentioned in this table are all Class B diseases.

3.1.3 Relevance to Japan's ODA Policy

At the time of appraisal, this project was consistent with Japan's ODA policies. First, the priority areas of the Country Assistance Policy for China (2001) included "assistance in infectious disease control" and "strengthening of human resource development, such as through the dispatch of experts and acceptance of trainees" as methods of providing assistance to cope with global issues. Additionally, the priority areas of the Country Assistance Strategy for the 2003 fiscal year created by the Japan International Cooperation Agency (JICA) (Japan Bank of International Cooperation at the time of appraisal of this project) included, as a means of addressing the need to respond to the weaknesses of the public health system revealed by the rapid spread of SARS, a plan to support the development of basic facilities and human resources for public health that would contribute to the reinforcement of infectious disease control.

In this way, this project has been highly relevant to China's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

At the time of appraisal, the planned outputs were: (1) procurement of equipment (through a Japanese ODA loan and funds from the Chinese side), (2) civil works (through funds from the Chinese side), and (3) training to strengthen the capacities of personnel in charge of infectious disease control (through funds from the Chinese side). These were implemented for a total of 53 institutions, including 19 CDCs (one provincial and 18 prefectural) in 18 prefecture-level cities, 17 IDHs in 17 prefecture-level cities, and 17 emergency centers in 17 prefecture-level cities (the IDH

and emergency center in Zhengzhou were not included). The outputs that were actually realized were almost identical to those planned, although a small area of the plan was modified and additional equipment were procured for non-infectious diseases.

(1) Procurement of equipment

Table 2 shows the plan at the time of appraisal in comparison to the actual equipment procurement. There were some modifications, such as an adjustment of the quantities due to a review of the demands, a change of items due to the realization that some of the planned equipment had become obsolete before it was procured, and some equipment that was urgently required was procured using funds from the Chinese side without waiting for this project. While it is considered reasonable that the project re-selected items in accordance with the circumstances, such a change of items would have been unnecessary if the project had not been delayed (see "3.2.2.2 Project Period").

The additional procurement was made using the remaining balance of the Japanese ODA loan. As a result, equipment outside the scope of the original plan was procured in recognition of the need to responding to emergency public health cases other than those that concern infectious diseases. In addition, due to a policy change, the hospital that was planned to be the targeted IDH in Luoyang became a general hospital for the prefecture (another hospital was designated as the IDH and the facilities and equipment there were developed using the provincial and prefectural funds). This meant that this project partly covered the procurement of equipment for responding to non-infectious diseases, which is not considered to be a problem because responses to non-infectious diseases will be effective in preventing infection by improving people's health. Additionally, such procurement does not contradict the project objective stated in the Loan Agreement[8].

The items to be procured were selected in the following way: the provincial PHFPC and the 53 targeted institutions, which virtually implemented this project, prepared a standard list of equipment, consisting of the basic equipment and recommended equipment, for each type of institution; the individual targeted institutions added specific information to the list, such as existing equipment and equipment that was planned to be procured, and then selected the items they required.

[8] The Loan Agreement states satisfaction of public health needs, improvement of people's health status, building of local governments' capacity to respond to sudden public health incidents, etc., as the project objectives. The objective mentioned in "1.2 Project Outline" of this report is the reordering of the more specific objectives described in the appraisal documents.

Table 2: Planned and actual equipment procured

Institution	Plan (appraisal)	Actual
CDCs	A total of 2,857 pieces for 19 institutions (one provincial and 18 prefectural CDCs). ・ Laboratory testing equipment (Categories A, B, and C) ・ Equipment for health education such as projectors and information devices such as data servers. ・ Emergency examination and processing vehicles for epidemic situations, etc.	A total of 2,508 pieces for 19 institutions. (Originally planned) A total 2,483 pieces for 19 institutions. The procuring of types of equipment mostly adhered to the plan except for some changes of items (Categories A, B, and C). (Additionally procured) A total of 25 pieces for five institutions, mainly consisting of laboratory testing equipment (Category X).
IDHs	A total of 2,747 pieces for 17 institutions (located in 17 prefecture-level cities except Zhengzhou), including diagnostic equipment such as electrocardiographs (ECGs), disinfectant and treatment equipment, beds, ambulances, on-board equipment for ambulances, etc. (Categories A, B, and C).	A total of 2,873 pieces in 17 institutions. (Originally planned) A total of 2,826 pieces for 17 institutions. The procuring of types of equipment mostly as adhered to the plan except for some changes of items (Categories A, B, and C). In Luoyang, the targeted institution was designated as a general hospital, not an IDH. (Additionally procured) A total 47 pieces for six institutions, including diagnostic equipment such as CT scanners (Category D) and laboratory testing equipment (Category X).
Emergency centers	A total of 802 pieces for 17 institutions (located in 17 prefecture-level cities except Zhengzhou), including ambulances (normal and negative pressure), ECGs, etc.	A total of 836 for 17 institutions. (Originally planned) A total of 791 pieces for 17 institutions. The procuring of types of equipment mostly as adhered to the plan except for some changes of items (Categories A, B, and C). (Additionally procured) A total 45 items for two institutions, including diagnostic equipment such as CT scanners (Category D) and laboratory testing equipment (Category X).

Sources: JICA documents; documents provided by the executing agency; responses from the executing agency and targeted institutions.

Note: In the appraisal, the equipment required for each targeted institution was classified in the categories listed below. The executing agency agreed that those classified under Category A, B, or C were eligible for procurement using the ODA loan.

Category A: equipment recognized as basic equipment for infectious disease control; Category B: recommended equipment for infectious disease control; Category C: general equipment required for infectious disease control; Category D: equipment not related to infectious diseases; Category X: equipment related to infectious disease control but not recognized as those within the scope of the ODA loan under this project. In the additional procurement, Category D and Category X equipment were procured using the ODA loan.

(2) Civil works

The civil works implemented through this project involved the new construction or the extension and/or rehabilitation of the facilities of the targeted institutions, which constituted part of the civil works implemented with the funds provided by the Chinese government. Among the targeted institutions, six IDHs were newly established facilities. For some institutions, the floor area actually developed was increased or decreased from the original plan as a result of design changes. Also, in interviews conducted for this ex-post evaluation, a small number of institutions indicated that some construction work implemented outside the scope of this project was recorded as a planned or actual output of this project, showing a problem relating to recording inaccuracies.

It was reported by the executing agency that the design and construction of facilities such as the CDCs' laboratories and the isolated waiting rooms and negative pressure wards of the IDHs satisfied the biosafety standards of the World Health Organization (WHO) and the Chinese government.

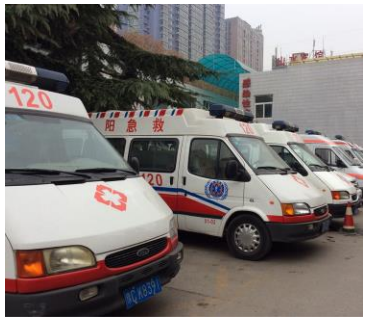
Table 3: Planned and actual civil works (funded by the Chinese side)

Institution	Plan (appraisal)	Actual
CDCs	A total of 82,309m^2 for 19 institutions, including the expansion (nine institutions), new construction, and moving (10 institutions) of laboratory buildings.	A total of 76,689m^2 for 18 institutions. The civil works for Zhengzhou CDC were implemented as part of developments made outside this project (the reason why this was included in the project scope at the time of the ex-ante evaluation is unknown).
IDHs	A total of 208,088m^2 for 17 institutions, including the expansion (11 institutions) and new construction (six institutions) of infectious disease wards.	A total of 166,403m^2. The civil works on Kaifeng IDH (expansion of the existing facilities) were implemented as part of developments made outside this project (the reason why this was included in the project scope at the time of the ex-ante evaluation is unknown).
Emergency centers	None	3,000m^2 for one institution (Pingdingshan).

Sources: JICA documents; responses from the executing agency and targeted institutions.

A biological safety cabinet installed at a prefectural CDC (Xinxiang).

An infectious-disease ward. The building is designed to control infection through the use of design aspects such as negative pressure and double (isolated) corridors (Anyang).



Ambulances at an emergency center. The nearest vehicle is a negative pressure ambulance (Luoyang).

(3) Training to strengthen the capacities of the personnel in charge of infectious disease control

The project's plan included activities such as sending the personnel in charge of infectious disease control to upper-administrative-level institutions in China for a short or medium time period and inviting Chinese experts from Beijing, Shanghai, etc., to Henan Province, all through the use of Chinese funds. The planned and actual numbers of trainees are reported in summary in Table 4, although the numbers vary by institution (i.e., absolute number of persons, cumulative total, man-months). It should be noted that the targeted institutions did not have detailed figures such as how many were sent to other institutions, how many were trained at their own institutions, or the number of experts invited and the dates of the visits. Additionally, a Japanese expert was reportedly invited for one month to teach how to operate the equipment procured for infectious disease control, although details on this are not clear.

After the completion of this project, "Training for Japanese ODA Loan Public Health Project (Henan Province)" (2012–2013), a form of technical assistance related to ODA loans, was implemented and approximately 1,600 persons received further training on topics such as operation

of equipment, testing and diagnosis, etc.

Table 4: Planned and actual numbers of trainees (funded by the Chinese side)

Institution	Plan (appraisal)	Actual
CDCs	A total of 660 persons from 19 institutions	A total of 1,095 persons from 19 institutions
IDHs	A total of 1,099 persons from 17 institutions	A total of 1,037 persons from 17 institutions
Emergency centers	None	A total of 3,677 persons from 17 institutions

Sources: JICA documents; responses from the executing agency and targeted institutions.
Note: Counting methods vary by institution (i.e. absolute number of persons, cumulative total, man-months).

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual total project cost was 6,249 million yen (of which 4,635 million yen was sourced from the ODA loan) and this was lower the planned cost (ratio to the planned amount was 90%, or 82% when only counting the actual amount spent on the originally planned outputs, i.e., excluding the expenses for the additional outputs; see Table 5 for breakdown). A report made by the executing agency states that the project cost was lower due to efficient contracting, which resulted from international competitive bidding and changes in the exchange rate.

Table 5: Planned and actual project costs

(Unit: million yen)

	Plan (appraisal)						Actual					
	Foreign currency		Local currency		Total		Foreign currency		Local currency		Total	
		ODA Loan		ODA Loan		ODA Loan		ODA Loan		ODA Loan		ODA Loan
Procurement of equipment	4,576	4,576	0	0	4,576	4,576	4,635	4,635	192	0	4,852	4,635
Civil works	0	0	1,418	0	1,418	0	0	0	1,206	0	1,206	0
Training	0	0	50	0	50	0	64	0	128	0	192	0
Administration cost, etc.	0	0	243	0	243	0	0	0	0	0	0	0
Price escalation	211	211	4	0	215	211	0	0	0	0	0	0
Physical contingencies	229	229	86	0	315	229	0	0	0	0	0	0
Interest during construction	0	0	121	0	121	0	0	0	0	0	0	0
Total	5,016	5,016	1,922	0	6,938	5,016	4,699	4,635	1,525	0	6,249	4,635

Sources: Prepared based on JICA documents and responses from the executing agency.
Notes: 1) The procurement of the equipment described in the original plan actually cost 3,772 million yen. 2) Planned exchange rate: 1 yuan = 14.3 yen; actual exchange rate: 1 yuan = 14.0 yen (the average during the period between 2003 and 2012 was applied since the figures in local currency for yearly expenses were not available).

3.2.2.2 Project Period

The project period was planned to be 34 months, from March 2004 (the date that the Loan Agreement was signed) to December 2006 (the date of the project's completion and of the handover of the equipment); however, the actual period was 102 months, from March 2004 to August 2012 (the date the handover of equipment was completed), which was significantly higher

the planned timetable (the ratio to the planned number of months was 300%, or 171%[9] when only counting the number of months spent on the originally planned outputs, i.e., excluding the period exclusively spent on the additional outputs; see Table 6 for details). Major reasons for the longer project period include, besides the additional outputs, delays in tender procedures for the procurement of equipment and delays in the delivery of some equipment by contractors. Nevertheless, it could be said that the delays were maintained at a minimum considering that the executing agency had never before handled an international competitive bidding that was as large-scale and complex as this.

Training was also delayed because it was implemented in conjunction with the procurement of equipment.

The civil works component was delayed for only two institutions as a result of, according to the executing agency, a shortage of funds on the part of the contractor.

Table 6: Planned and actual project periods

	Plan (appraisal)	Actual
Signing of the Loan Agreement	March 2004	March 2004
Civil works	September 2003 – January 2006	March 2003 – January 2007 (mostly as planned except for two institutions)
Procurement of equipment (Tender)	August 2004 – March 2006	March 2004 – September 2010 (the originally planned portion was completed within 2006)
Procurement of equipment (manufacturing, transportation and installation)	July 2005 – December 2006	December 2004 – August 2012 (the originally planned portion was completed within 2008)
Training	May 2004 – March 2006	May 2004 – May 2012
Project completion (duration)	December 2006 (34 months)	August 2012 (102 months)

Sources: Prepared based on JICA documents, documents provided by the executing agency, and responses from the executing agency.

Note: The documents provided by the executing agency state that the project completion date (the date the procurement of equipment was competed) was June 2013. The evaluator confirmed with the executing agency that the project period featuring that completion date included the test run period for the equipment delivered and the training period under the Technical Assistance Related to ODA Loans, and that the "handover" of equipment, the project completion date defined at the signing of the Loan Agreement, and the training implemented as a part of this project had been completed in August 2012.

3.2.3 Results of Calculations of Internal Rates of Return (Reference only)

Due to the nature of the project, a quantitative analysis of the internal rate of return (IRR) was not possible. As the IRR was not calculated at the time of appraisal, IRR calculation was not included in the scope of the ex-post evaluation.

As stated above, although the total project cost was within the plan, the project period significantly

[9] Although the exact completion date of the originally planned portion was not specified, based on the information from the executing agency that the original portion was completed in 2008, it has been provisionally assumed to have been completed in December 2008.

exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness[10] (Rating: ③)

After completion of the project, the operation and effect indicators generally showed improving trends and mostly satisfied, when there were any, the standards (or defined values) set by the Chinese government. It was observed that the targeted institutions were capable of better performing their respective functions, namely: CDCs' prevention of infectious diseases and response to outbreaks, IDHs' diagnosis and treatment of infectious diseases, and emergency centers' transportation and pre-hospital care of patients, by utilizing the facilities and equipment developed as a result of this project. Therefore, it can be said that the project's objective of strengthening infectious disease control in Henan Province was achieved.

3.3.1 Quantitative Effects (Operation and Effect Indicators)[11]

(1) Improvement of infectious-disease-control functions throughout Henan Province

It is considered that infectious disease control in the province as a whole improved after the project, as "the number of beds for infectious diseases per population" and "time required from an outbreak to the reporting of an infectious disease" (both are classified as operation indicators) showed improvement or satisfied the defined values (see Table 7).

Table 7: Operation and effect indicators (throughout all of Henan Province)

	Baseline	Target	Actual	Actual
	2002	2006	2012	2014
	Baseline Year	Completion Year	Completion Year	2 Years After Completion
1) Number of beds for infectious diseases per population (per 1,000 persons) *1	0.04	0.05	0.42	0.34
2) Time required from an outbreak to the reporting of an infectious disease	Not mentioned	24 hours*2	24 hours	24 hours

Sources: JICA documents; documents provided by the executing agency; responses from the executing agency.
Notes: 1) Corresponding to one of the operation and effect indicator set at the time of appraisal. 2) The value defined by Henan Province. The planned value at the time of appraisal is unknown.

[10] The sub-rating for effectiveness is to be given with consideration of the impact.

[11] Three operation and effect indicators were set at the time of the appraisal of this project, namely: (a) the number of beds for infectious diseases per population, (b) the laboratory testing capacity of the provincial CDCs (degree of increase of testable items), and (c) the fatality rate of infectious diseases and the fatality rate in emergency departments. In this ex-post evaluation, indicators (a) and (b) were classified as operation indicators and indicator (c) was classified as an effect indicator. However, these indicators were insufficient to ascertain whether different types of institutions, including prefecture-level CDCs and emergency centers, utilized their facilities and equipment and produced effective results. Therefore, the evaluator additionally used some supplementary indicators based on a reference document provided by JICA. As these additional indicators did not have specific target values for this project, the degree of their achievement was examined either (i) by applying the standards designated by the Chinese government or the judgment criteria used in an ex-post evaluation conducted in 2012 for the Public Health Projects in the provinces of Hunan, Jiangxi, Anhui, Shanxi, Jilin, Heilongjiang, and Liaoning (hereinafter called "the preceding ex-post evaluation"), or (ii) by analyzing changes before and after the implementation of the project by using yearly data.

It is also noted that most of the indicators used for this evaluation are not listed as "operation indicators" or "effect indicators;" therefore, the evaluator classified them into operation indicators and effect indicators based on the nature of each indicator.

(2) Enhancement of the infectious-disease-control functions of individual institutions

1) CDCs

Table 8 shows major indicators (all classified as operation indicators) that reached an approximately satisfactory level. Therefore, it is considered that the functions of CDCs were enhanced as a result of this project.

"The number of testable items within the test items defined by law" significantly increased after the project in terms of both the total number of items a CDC could test for and the test items focused on in this project. The provincial CDCs achieved the target of acquiring 85% of the designated test items. Although the average for the prefectural CDCs was slightly below 85%, when examining the data for the individual institutions it can be said that they almost achieved the target (while not shown in the table, eight of the 16 institutions that responded to the questionnaire for the ex-post evaluation achieved over 85% and their number of testable items focused on in this project remarkably increased). In particular, an important outcome highlighted by all of the respondent institutions was that they had become capable of performing nucleic acid testing for viruses (such as influenza viruses) and bacteria.

"The total number of samples tested" increased, while the figures disaggregated by disease fluctuated depending on incidences of the concerned diseases. "Time required for reporting test results" was shortened. Such trends show that the equipment for testing samples has been appropriately incorporated. In addition, although not shown in the table, the false-positive rate that shows the accuracy of testing results (the higher, the more accurate) almost reached 100% for major diseases during the period between 2002 and 2007 and maintained that level thereafter.

The operational status of major testing equipment (procured in the course of this project) was mostly good. The utilization rate[12] reported by 14 targeted institutions was over 80% for the majority of the major equipment. The types of expensive equipment that they commonly identified as particularly useful included quantitative fluorescence PCR[13] machines (for nucleic acid testing of bacteria and viruses) while, in relation to equipment important for infectious disease control regardless of price, biological safety cabinets (for handling biohazards) were also noted as particularly useful. For equipment with low utilization rates, they named microorganism analyzers (the production of this machine's reagent was discontinued in 2012) and some others that they use less frequently after they purchased upgraded models). Nevertheless, the respondent institutions said that they had fully used all such equipment until they purchased new versions with their own budgets. The average utilization rate of such equipment was approximately 70%.

Training provided by the targeted CDCs for CDC personnel at subordinate administrative levels also increased. However, at the time of the ex-post evaluation, only five institutions answered that

[12] In the responses from the targeted institutions, a utilization rate was defined as the ratio of actual operation hours to expected operation hours, both of which were represented in terms of an accumulated total during the period from installation to the time of this ex-post evaluation.

[13] PCR stands for polymerase chain reaction.

they still use the training equipment procured in the course of this project (such as projectors). As most of the training equipment had been purchased in approximately 2006, many institutions have already replaced them with newer versions.

Table 8: Operation and Effect Indicators (CDCs)

Average of responses from CDCs		Baseline 2002 Baseline Year	Target 2006 Completion Year	Actual 2012 Completion Year	Actual 2014 2 Years After Completion
1) Number and percentage of testable items among CDCs' designated test items[*1]					
Provincial CDC	Total (Designated=426 items)	250 (59%)	362 (85%)[*3]	418 (98%)	426 (98%)
	This project[*2] (Designated=164 items)	88 (54%)	139 (85%)	163 (99%)	163 (99%)
Prefectural CDC	Total (Designated=381 items)	140 (37%)	324 (85%)	232 (61%)	234 (61%)
	This project (Designated=147 items)	59 (40%)	125 (85%)	111 (75%)	113 (77%)
2) Number of samples tested[*4]					
Influenza		60	Not mentioned	317	426
AIDS		501	Not mentioned	877	1,622
Hand-foot-and-mouth disease		0	Not mentioned	345	232
3) Time required for the testing of a sample (hours)					
Influenza		5.5	Not mentioned	5.1	4.7
AIDS		3.5	Not mentioned	2.3	2.3
Hand-foot-and-mouth disease		-	Not mentioned	3.8	3.8
4) Number of trainees that participated in the training organized by the CDC (persons)		368	Not mentioned	1,141	998

Sources: JICA documents; responses from targeted institutions (valid responses from 16 institutions).

Notes: 1) Corresponding to one of the operation and effect indicators set at the time of appraisal. 2) The rows titled "This project" concern the test items for diseases that this project aimed to address, namely, acute communicable/foodborne/waterborne diseases, viral diseases, parasitic diseases, microbial diseases, etc. 3) The target value of 85% of designated test items is a guide that was used in the preceding ex-post evaluation. Therefore, actual performance that is lower than this value does not necessarily signify a lower evaluation of effectiveness. 4) For this indicator and those thereafter, the figures represent average values for all respondent CDCs because no differences were seen between the provincial and prefectural CDCs. The figures for "the number of samples tested" for 2002 (non-zero values show that testing had been possible before this project) in relation to influenza were provided from the provincial CDCs only and, in relation to AIDS, by the provincial and Hebi CDCs.

2) IDHs

Table 9 shows major indicators[14]. As all of these indicators show improving trends, it is considered that the functions of IDHs were enhanced. It should be noted that such improvements are partly due to factors outside this project (i.e., effects of investment in facilities receiving funding from the Chinese side).

"In-hospital infectious rate," "in-hospital mortality rate," and "the number of tests implemented" all show improving trends. All of the institutions that responded to the questionnaire provided positive comments concerning the effects of this project, such as the increase in the amount of testing they can conduct and the increase in items that they can test in their institutions, which in turn leads to more prompt treatment.

[14] Of the twelve IDHs that provided valid answers, the data from the hospital in Luoyang were excluded from this analysis as it was not an IDH. The data from this hospital are used in "3.4.2 Other Impacts."

Among the indicators shown in Table 9, "in-hospital infection rate" and "in-hospital mortality rate" were classified as effect indicators, while the rest were classified as operation indicators.

"The number of patients" and "the number of beds" also increased. This project contributed to the increase in patients as it increased the IDHs' capacity to accept a larger number of patients. This was achieved by developing facilities for in-patients and equipment for testing, diagnosis, and treatment. Similarly, the project directly contributed to the increase in "the number of beds" by procuring between 40 and 200 beds per hospital.

The operational status of the equipment procured under this project was good. In 2014, the average utilization rates of such equipment was over 90% for ICU equipment and around 84% for testing equipment. Among the expensive equipment, automatic biochemical analyzers were identified by the responding IDHs as particularly useful and, among important equipment for infectious disease control regardless of price, bedside monitors and TV patient monitors were also noted as particularly useful.

Table 9: Operation and Effect Indicators (IDHs)

Average or total of answers from IDHs	Baseline 2002[*1] Baseline Year	Target 2006 Completion Year	Actual 2012 Completion Year	Actual 2014 2 Years After Completion
1) In-hospital infection rate (%) (average)[*2]	1.19	Not mentioned	1.54	0.90
2) In-hospital mortality rate (%) (average)	0.77	Not mentioned	0.59	0.43
3) Number of tests implemented (total)				
Bacteriological test	24	Not mentioned	20,392	22,405
Biochemical test	10,989	Not mentioned	92,798	126,772
Blood cell test	11,703	Not mentioned	81,841	100,071
4) Number of patients (person) (average)				
Outpatients – infectious diseases	10,707	Not mentioned	26,245	24,845
Inpatients – infectious diseases	693	Not mentioned	4,126	7,841
5) Number of beds (average)	95	Not mentioned	164	190

Sources: JICA documents; responses from targeted institutions (valid responses from 11 institutions).
Notes: 1) The figures for 2002 are based on responses from the four institutions that had already conducted testing as IDHs at that time. 2) Although in-hospital infection rate seems to have increased between 2002 and 2012, this is because the data for 2012 include those from the hospitals that opened after 2002 (thus, these new hospitals were not included in the average for 2002). The figures for individual hospitals all show a steady decrease in infection rate.

3) Emergency centers

Table 10 shows major indicators (all classified as operation indicators). All of these indicators show improvement. Considering this together with qualitative information that was collected to supplement some indicators that had low reliability, it can be said that the functions of IDHs were enhanced.

In each city, the emergency center, which was targeted under this project, processes emergency calls and provides instructions. Ambulances are dispatched from the emergency center or emergency stations located in several areas in the city (mostly at hospitals). As shown in Table 10, the average values of service radius and emergency response time met the requirements, but the reliability of the data is not sufficiently high (see Notes 1 and 2 of Table 10). Nevertheless, several emergency centers commented in the interviews that the increased number of ambulances equipped

with life-saving appliances made it possible to concurrently respond to multiple emergency cases and, thus, shortened the response time.

"The number of ambulances," "the number of times of emergency transportation" and "the number of times of dispatch of ambulances" significantly increased after the project, which was directly influenced by the procurement of ambulances conducted through this project. There are not many cases of transportation related to infectious diseases, nor the transportation using negative pressure ambulances that can handle infectious disease cases. However, the interviewed emergency centers explained that negative pressure ambulances must be prepared to respond to sudden outbreaks of infectious diseases even though there are not many occasions where they are required. To maintain the condition of the vehicle, negative pressure ambulances are also used for non-emergency transportation. Additionally, some ambulances procured in this project had since ceased functioning as ambulances for rescue service after years of use[15].

Table 10: Operation and Effect Indicators (Emergency centers)

Average of responses from emergency centers	Baseline	Target	Actual	Actual
	2002	2006	2012	2014
	Baseline Year	Completion Year	Completion Year	2 Years After Completion
1) Service radius (km)[*1]	Required: 14 Actual: 15	Not mentioned	Required: 22 Actual: 26	Required: 23 Actual: 27
2) Emergency response time (minutes)[*2]	Required: 6 Actual: 5	Not mentioned	Required: 4 Actual: 3	Required: 3 Actual: 3
3) Number of times of emergency transportation (case)	3,100	Not mentioned	6,769	6,790
Of which are related to infectious disease	37	Not mentioned	16	17
4) Number of ambulances (vehicle)	6	Not mentioned	14	14
Of which were procured under this project	0	Not mentioned	6	6
5) Number of negative pressure ambulances (vehicle)	0	Not mentioned	2	2
Of which were procured under this project [*3]	0	Not mentioned	0.4	0.4
6) Number of times of dispatch of ambulances (case)	3,797	Not mentioned	8,364	9,141
Of which were by negative pressure ambulances	0	Not mentioned	51	34

Sources: JICA documents; responses from targeted institutions (valid responses from 13 institutions).

Notes: 1) The interviewed institutions explained that the "required" values are set by each prefectural city depending on population and area. The actual average values do not make a great deal of sense because the service radius in Jiaozuo, Sanmenxia, and Shangqiu is very large. In relation to whether each emergency center met its required service radius, all but one had met its requirements as of 2014. Nevertheless, such data are yet to accurately show the effects of the project since there were opinions such as "the actual value is naturally within the required value because requirements must always be complied with."

2) Time from receiving a call to dispatch. However, the reliability of the data is questionable as there were comments similar to the one mentioned in 1) above.

3) The number of negative pressure ambulances is a decimal below 1 as it is the average of the answer for "one ambulance" and "no ambulance (any longer)." (Under this project, every emergency center procured one ambulance.)

[15] According to the interviewed emergency centers, national regulations state that the operating life of an ambulance used for pre-hospital rescue service is eight years. The ambulances procured under this project were delivered in 2004 and replacement commenced in 2012. It was explained that many of them had ceased functioning as ambulances and were now used as general vehicles.

3.3.2 Qualitative Effects

(1) Strengthening of infectious disease control

In addition to the effects described in "3.3.1 Quantitative Effects (2) Enhancement of infectious-disease-control functions of individual institutions," after they procured networking equipment through this project such as servers, CDCs became capable of promptly reporting the occurrence of a disease and of sharing related information through the Internet. In China, a nationwide infectious disease surveillance system was developed in 2004 that included a web-based direct-reporting system involving the participation of medical institutions at each administrative level. The equipment procured through this project contributed to the improvement of the network environment of CDCs, which plays a central role in the surveillance system at provincial and lower levels (together with servers and other equipment that all of the targeted institutions additionally installed after this project had completed).

Another effect is that the different types of targeted institutions coordinate on responding to an occurrence of an infectious disease in such a way that the emergency center first responds to the case, the CDC confirms the case and provides instructions, and the patient is transported to the IDH for treatment. For example, in Hebi there was a case that during the outbreak of the new influenza in 2009 a seriously ill patient who was pregnant was transported to the IDH by the negative pressure ambulance and received treatment there using the ICU equipment procured through this project. The mother (the patient) and her baby then recovered and were released from the hospital.

(2) Enhancement of the capacities of personnel related to infectious disease control

The Financial Department, the executing agency, commented that the training provided under this project and the following "Technical Assistance Related to ODA Loans" enhanced the awareness of public health and the capabilities of the province, prefectures, and counties as a whole. Additionally, the CDCs that the evaluator visited acknowledged that the training was practical as it was provided through the use of equipment (procured through this project) that they would actually be using in the field. According to the executing agency, the personnel trained in the process of the project would continue to play key roles in the frontline against infectious disease and public health crisis in the province.

3.4 Impacts

3.4.1 Intended Impacts

The intended impact, namely, "contributing to the improvement of the health status of local residents" was achieved. The case fatality rate of Class A and Class B infectious diseases (the number of deaths per 100 patients)[16] decreased from 0.42% in 2002 (before implementation of this project) to 0.38% in 2012 (the project completion year) and to 0.34% in 2014 (the ex-post evaluation year). The executing agency commented that there have been no large outbreaks of

[16] One of the operation and effect indicators set at the appraisal. The other indicator was "case fatality of emergency patients" but, according to the executing agency and targeted institutions, no data were collected for this indicator.

infectious disease for the past ten years as a result of the functioning system of prevention, emergency response, and treatment; a system in which this project played an important role. The functions and activities of the institutions targeted by this project, as shown in "3.3 Effectiveness," are considered to have contributed to such a situation[17].

3.4.2 Other Impacts

No negative impacts were observed. In relation to impacts on the natural environment, all targeted institutions reported that there are no issues in this regard as they dispose of medical waste at medical-waste-disposal centers in their respective prefectures and effluent is treated in accordance with the prefectural regulations. Regarding land acquisition, vacant lots of public land were used for all cases of relocation and/or the new construction of the facilities of the sixteen targeted institutions (10 CDCs and six IDHs), thus involving no resettlement or compensation.

As positive impacts other than those already stated so far, it was observed that the facilities and equipment of the emergency centers and some hospitals were also used for general public health cases that were not related to infectious diseases. First, the emergency center equipment improved emergency response capability not only in regard to infectious diseases but also various other emergent events (diseases and accidents). When the Great Sichuan Earthquake occurred in 2008, 70 ambulances and emergency examination and processing vehicles procured through this project were dispatched from Henan Province to conduct rescue operations.

As mentioned in "3.2.1 Project Outputs," in Luoyang, the Second Hospital of Henan University of Science and Technology, the targeted hospital, became a general hospital. It was observed that the testing and diagnosis equipment procured through this project was utilized for diagnosis and treatment of non-infectious diseases in Luoyang.

As stated above, this project has largely achieved its objectives. Therefore, effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The operation and maintenance (O&M) of the facilities and equipment developed under this project is conducted by each targeted institution under the supervision of the Henan Provincial People's Government (PHFPC), in accordance with the plan made at the appraisal.

A common management system for public health and infectious diseases throughout China (Box 1) has also been implemented in Henan Province. While the basic structure of the system is same as the one designed at the time of appraisal, it was reinforced with a more detailed specification of requirements.

[17] It was also commented from the executing agency that as a result of the upgrading of service quality of IDHs, serious contagious disease patients need not to go to large hospitals for examination and treatment as they did in the past, which helps avoid possible disease spreading in the process of patient transfer.

The allocation of personnel in each targeted institution is mostly in accordance with government regulations. Some targeted institutions, mostly CDCs, highlighted the insufficient number of staff but they acknowledged that there were no cases where they could not conduct their duties due to a lack of manpower.

In this way, the O&M system is secured and future prospects are high as no factors that necessitate major changes were found. Therefore, it can be concluded that there is no problem in relation to the institutional aspects.

Box 1: Management system for public health and infectious diseases

The public health management system and the mechanisms of command and coordination, information exchange, and inter-agency cooperation have been developed based on the requirements stipulated in the Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases (amended in 2004) and the Sudden Acute Infectious Disease Prevention and Control Strategy (2007). The basic structure of the system is common throughout China: PHFPCs/Public Health and Family Planning Bureaus at provincial, prefectural and county levels make decisions on policies and responses to outbreaks of infectious diseases. CDCs at provincial, prefectural, and county levels undertake practical operations, such as the collection of information for decision-making. Hospitals and emergency centers are regarded as implementing agencies for reporting and treatment of cases of outbreaks of infectious diseases.

In the sector of the commanding cooperative mechanism, the health and family planning commissions at all levels shall organize consultation expert groups to collect epidemic information when there is sudden occurrence of epidemics, appraise risks, and create a prevention plan (practical operations are conducted by the CDC). Additionally, the provincial PHFPC gives instructions to the public health and family planning sections at lower administration levels to conduct epidemiological investigation, laboratory diagnosis and treatment, and also supports the local government of the area where the disease occurred in relation to emergency response operations.

In the sector of information exchange mechanism, the health and family planning commissions/CDCs at all levels shall develop a mechanism for information exchange with related departments, regularly report on the epidemic situation in China and abroad and the progress of prevention and control operations, and collect information on sudden acute infectious diseases through sources such as quarantine at the borders and surveillance in foreign countries. This is all performed in order to identify trends of infectious diseases. Additionally, information feedback is provided from the CDC to medical institutions and from laboratories to practitioners of clinical treatment.

In the sector of departmental cooperation mechanism, the health and family planning commissions/CDCs at all levels shall develop cooperation mechanisms for health, agriculture, forestry and border quarantine, to jointly examine prevention and control measures against serious sudden and acute infectious diseases, to monitor epidemic situations, and to develop a framework of cooperation for prevention and control.

Sources: responses from the executing agency and documents provided by the executing agency.

3.5.2 Technical Aspects of Operation and Maintenance

In relation to the technical skills required to operate infectious disease control, as described in "3.2 Efficiency" and "3.3 Effectiveness," all targeted institutions have operated smoothly and produced satisfactory results.

To acquire the requisite technical skills to operate and maintain procured equipment, staff from all of the targeted institutions received training on the O&M of the equipment acquired as a result of this project and also participated in other training courses held after this project had completed, such as courses provided by equipment manufacturers. According to the executing agency, administrative orders require staff to regularly receive technical training even after project completion. The 47 targeted institutions that provided specific answers to the questionnaire all responded that the "skill level of the staff in charge of the O&M of the medical (or testing) equipment is sufficient," and "manuals and usage records of the equipment are well prepared/recorded."

At the time of appraisal, it had been highlighted that some of the equipment to be procured may be too advanced (i.e., there was a risk of a mismatch between the equipment and the levels of medical care and infrastructures). At the time of the ex-post evaluation, it was confirmed that no such situation occurred.

Consequently, the requisite O&M skills are present in the institutions and the future prospects are high as no factors for major changes were found. Therefore, it can be concluded that there is no problem in relation to the technical aspects.

3.5.3 Financial Aspects of Operation and Maintenance

(1) CDCs

CDCs are fully financed by government funds. Although the division between the central and local government funds is not clear, the executing agency commented that there is no financial problem in any CDC as it has secured its necessary budget from either level of the government. The amount of funding assigned to the targeted institutions that provided budgetary data has increased over the past three years and the disbursement was almost same or larger than the amount initially requested.

Table 11: Budget of CDCs

(Unit: million yuan)

	2011	2012	2013
Provincial CDC			
Requested	45.60	50.50	55.00
Disbursed	45.48	49.42	54.71
Prefectural CDC average (10 institutions)			
Requested	10.76	13.44	14.57
Disbursed	14.16	15.62	17.10

Source: responses from targeted institutions (11 institutions)

(2) IDHs

Public IDHs in Henan Province are all non-profit medical institutions, some of which are 100% subsidized by the government and some operates with both financial subsidies from the government and business income (operating revenue). The majority of revenue for all of the nine IDHs that provided budgetary data is operating revenue. For all of these, their budget has increased for the past three years and revenue and expenditure is almost balanced. All of these IDHs answered that "the financial situation is adequate," and the executing

Table 12: Revenue and expenditure of IDHs

(Unit: million yuan)

(Average)	2011	2012	2013
Revenue	29.43	34.38	37.63
Doctor's fee	15.77	26.38	28.59
Subsidies	3.28	3.93	4.32
Expenditure	26.91	32.68	36.01
Balance	2.51	1.70	1.62

Source: responses from targeted institutions (9 institutions)
Note: There are rounding errors.

agency explained that, even among the IDHs that did not respond to the questionnaire, there is no hospital that cannot provide services due to a lack of budget.

(3) Emergency centers

Emergency centers are fully financed by government funding. Of the 13 centers that provided budgetary information (of which five centers provided data on the actual amount), all but one center answered that their financial conditions are adequate. For the center that answered that it had an insufficient budget and those that did not provide answers, the executing agency explained that there is no center that cannot provide services due to a lack of budget. The budget amount has increased for the past three years and the disbursement was the same or larger than the amount initially requested.

Table 13: Budget of emergency centers

(Unit: million yuan)

(Average)	2011	2012	2013
Requested	1.11	1.25	1.45
Disbursed	2.69	3.05	3.62

Source: responses from targeted institutions (5 institutions)

Consequently, the O&M budget for the targeted institutions is secured and the future prospects are high as no factors for major changes were found. Therefore, it can be concluded that there is no problem in relation to financial aspects.

3.5.4 Current Status of Operation and Maintenance

O&M of laboratory equipment is conducted by the personnel in charge of individual laboratories (or, in the case of large equipment, in charge of each set of equipment). These individuals conduct daily checks and record the condition of the equipment in the record book whenever the equipment is used. In all of the 17 institutions visited by the evaluator it was observed that all equipment had unique identification numbers attached; the record books were well prepared, either on paper or a computer; and the usage and conditions of each set of equipment was recorded for the entire period from the time of installation to dates near the date of the evaluator's visit for the ex-post evaluation.

In case of a breakdown of equipment, the manufacturer, supplier, or third-party repair agents are commissioned to conduct the necessary repair work. Some institutions were not satisfied with the insufficient after-sale services of certain manufacturers, as some refused to visit an institution in a distant place to repair just one piece of equipment. In general, however, the executing agency and targeted institutions said that there were no major problems in relation to the O&M of the equipment.

A number of the equipment procured under this project has exceeded their estimated service lives and replacement of these pieces has been performed. Such equipment is replaced when necessary, and maintenance of the replaced equipment is also properly conducted. No issues were reported in relation to acquiring spare parts as they are stocked or purchased when necessary. However, the bacteria identification analyzers, one type of expensive equipment mainly procured

by CDCs, have been unusable since approximately 2013 even though they are still in good condition. This is because the manufacturer discontinued production of the necessary reagents. Consequently, the CDCs had no choice but to purchase the successor model. According to the targeted institutions, this device is essential but produced by only one manufacturer. Therefore, this situation is considered to be inevitable.

Consequently, the O&M status of the targeted institutions is mostly good and the future prospects are mostly high. Therefore, it can be concluded that there is no problem in this respect.

Overall, no major problems have been observed in the institutional, technical, and financial aspects of the operation and maintenance systems. Therefore, sustainability of the project effects is high.

4. **Conclusion, Lessons Learned and Recommendations**

4.1 Conclusion

This project was to develop the facilities, equipment, and the human resources of the core organizations related to infectious disease control in Henan Province; namely, CDCs, IDHs and emergency centers. This was performed with the objective of strengthening control of infectious diseases in the province as part of China's efforts to improve public health infrastructures that had been accelerated since the outbreak of SARS in 2002. The relevance of the project's implementation was high as the project's objective was consistent with China's development policies and development needs for improving its public health service system, including upgrading its infectious disease control capabilities. The project's efficiency was evaluated to be fair because, while the project cost was within the planned expenditure, the project period significantly exceeded the timetable, mainly due to delays in the procurement of equipment. The project's effectiveness and impact were evaluated to be high as it was observed that the target institutions had strengthened their respective capacities, specifically: (i) CDCs improved their testing and networking for infectious disease control; (ii) IDHs improved their ability to accept patients as well as their level of testing and treatment; and (iii) emergency centers improved their ability to promptly respond to emergency cases. Furthermore, through improved coordination among these institutions, integrated response to infectious diseases, e.g., occurrence of a disease, identification, transportation, and treatment, was strengthened and, thus, contributed to a reduction in the case fatality rate of infectious diseases in Henan Province. The sustainability of the project's effects was also evaluated to be high, as there were no serious problems in relation to the institutional, technical, and financial aspects, nor with regard to the current operation and maintenance status of the developed facilities and equipment.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

There are no specific points to be improved. It is expected that the executing agency and targeted institutions continue the replacement of equipment that is already ongoing and which will become more intensified from now on, allowing the level of infectious disease control that was confirmed as accomplished at the time of the ex-post evaluation to be continuously maintained and further enhanced.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

The selection of equipment to procure based on a standard equipment list in a setting where a number of subprojects concern the procurement of various types of equipment

In the planning stage of this project (when the equipment procurement list was prepared), the executing agency and the 53 sub-project implementing agencies developed a list of equipment to be procured for each type of targeted institution. Each list consisted of basic equipment and recommended equipment. With information such as what equipment each facility already possessed at that time and what equipment they required, each institution selected necessary equipment from the list. This led to high level of utilization of the equipment procured by each targeted institution and a provision of services in accordance with the nation's requirements. Additionally, most of the procurement packages were implemented smoothly enough for large-scale procurement, although bidding and delivery were delayed. An underlying factor can be the clearly-defined objective of the procurement (i.e., what capacity was specified as the one that must be strengthened) as the infectious disease control had been regularized and standardized through the Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases.

Therefore, a project where a number of subprojects are tasked with procuring various types of equipment can prepare a standard list of equipment to procure, as this project did, in line with the standard (or policy) of the country/sector. Then, it can select the necessary equipment for each subproject by considering the needs of individual institutions or creating a list for each subproject that is based on the standard list with necessary adjustments made (i.e., add or omit items). To a certain extent, such a method would make it possible to conduct procurement in a standardized manner and would lead to a high degree of utilization of the procured equipment that are required and appropriate.

It should be noted as well that in order to enable such a mechanism to work, full consideration should be made to the configuration of the equipment to be listed, and flexibility of adjusting the list should be ensured so that it can cope with frequent model changes of equipment.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1.Project Outputs		
(1) Procurement of equipment	2,857 pieces at 19 CDCs 2,747 pieces at 17 IDHs 802 pieces at 17 emergency centers	2,508 pieces at 19 CDCs 2,873 pieces at 17 IDHs 836 pieces at 17 emergency centers
(2) Civil works (New construction or expansion)	82,309m^2 for 19 CDCs 208,088 m^2 for 17 IDHs	76,689 m^2 for 18 CDCs 166,403 m^2 for 16 IDHs 3,000 m^2 for one emergency center
(3) Training	660 persons from 19 CDCs 1,099 persons from 18 IDHs	1,095 persons from 19 CDCs 1,037 persons from 17 IDHs 3,677 persons from 17 emergency centers
2.Project Period	March 2004 – December 2006 (34 months)	March 2004 – August 2012 (102 months)
3.Project Cost		
Amount paid in Foreign currency	5,016 million yen	4,699 million yen
Amount paid in Local currency	1,922 million yen (124 million yuan)	1,525 million yen (109 million yuan)
Total	6,938 million yen	6,249 million yen
Japanese ODA loan portion	5,016 million yen	4,635 million yen
Exchange rate	1 yuan = 14.3 yen (As of August 2003)	1 yuan = 14.0 yen (Average between 2003 and 2012)