# THE STUDY REPORT

# ON

# THE PROJECT FOR PROMOTION OF PREVENTION OF

# INFECTIOUS DISEASES

# IN WESTERN SEVEN PROVINCES

# IN

# THE PEOPLE'S REPUBLIC OF CHINA

March 2002

JAPAN INTERNATIONAL COOPERATION AGENCY

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## PREFACE

In response to a request from the Government of the People's Republic of China, the Government of Japan decided to conduct a study on the project for Promotion of Prevention of Infectious Diseases in Western Seven Provinces and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to China a study team from November 26 to December 27 2001.

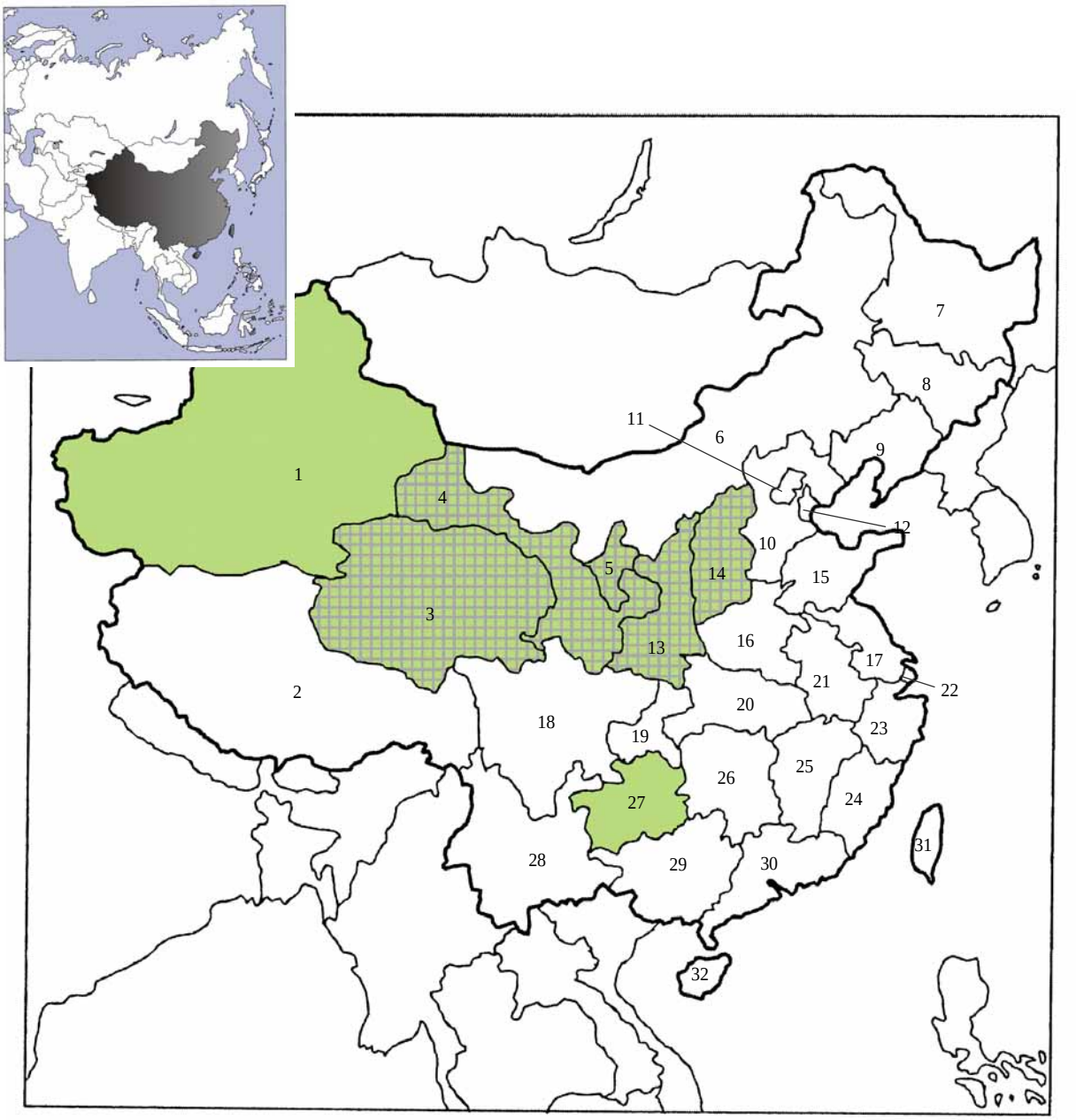
I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of China for their close cooperation extended to the team.

March 2002

Takao KAWAKAMI
President
Japan International Cooperation Agency

Location map




and Target area for this project Target for Project type technical cooperation（2000～）

**Province･Autonomous district**

| | | | |
|---|---|---|---|
| 1. Xinjiang 新疆 | 9. Liaoning 遼寧 | 17. Jiangsu 江蘇 | 25. Jiangxi 江西 |
| 2. Xizang 西蔵 | 10. Hebei 河北 | 18. Sichuan 四川 | 26. Hunan 湖南 |
| 3. Qinghai 青海 | 11. Beijing 北京 | 19. Chongqing 重慶 | 27. Guizhou 貴州 |
| 4. Gansu 甘粛 | 12. Tianjin 天津 | 20. Hubei 湖北 | 28. Yunnan 雲南 |
| 5. Ningxia 寧夏 | 13. Shaanxi 陝西 | 21. Anhui 安徽 | 29. Guangxi 広西 |
| 6. Nei Mongol 内蒙古 | 14. Shanxi 山西 | 22. Shanghai 上海 | 30. Guangdong 広東 |
| 7. Heliongjiang 黒龍江 | 15. Shandong 山東 | 23. Zhejiang 浙江 | 31. Taiwan 台湾 |
| 8. Jilin 吉林 | 16. Henan 河南 | 24. Fujian 福建 | 32. Hainan 海南 |

Target are is underlined

Contents



[Appendices]

**Abbreviations**

| | |
|---|---|
| AusAID | Australian Agency for International Development |
| BCG | Bacillus Calmette-Guerine |
| BHN | Basic Human Needs |
| DPT | Diphtheria-Pertussis-Tetanus Combined Vaccine |
| OPV | Oral Polio Vaccine |
| WHO | World Health Organization |
| UNICEF | United Nations Children's Fund |

# Chapter1 **Background of the Project**

Since 1996, the Ministry of Health in China (hereinafter referred to as MOH) has started replacement for the old cold-chain equipment that was procured in the early 1980s, with assistance of donors. Table 1-1 shows the details of equipment that UNICEF, AusAID, World Bank, Luxemburg and other donors assisted and will assist for replacement cold-chain equipment from 1998 to 2003. Many freezers and refrigerators have been donated to the provincial epidemic prevention stations, however neither of the freezer room nor cold room in the prefectural epidemic prevention stations has been replaced and none of them is scheduled to be replaced.

In addition, most of those refrigerators and freezers that will be donated by AusAID and Luxemburg will be delivered mostly for the health departments in townships and villages, and only a few will be allocated to the epidemic prevention stations on the county level.

Table 1-1: Details and Number of Equipment Procured for each Target Area by Donors

| | | MINISTRY OF HEALTH | UNICEF | World Bank | JICA | AUSAID | Luxemburg (WHO) | Local Government |
|---|---|---|---|---|---|---|---|---|
| Shanxi Province | | 1999 | | | | | | |
| Provincial Level | | | | | | | | |
| Prefecture/ County | Prefecture (11) | 4 cold rooms | | | | | | |
| | County (119) | No response | | | | | | |
| Township / Village Level | | | | | | | | |
| Guixzhou Province | | 1999-2001 | | 1999 | 1999 | | | 2000 |
| Provincial Level | | | | | | | | |
| Prefecture/ County | Prefecture (9) | 4 refrigerated trucks ('01) | | 5 cold rooms<br>4 freezer rooms | | | | 13 freezers<br>7 refrigerators |
| | County (86) | 8 pickup trucks ('99) | | | 3 pickup trucks | | | 36 freezers<br>150 refrigerators |
| Township / Village Level | | | | | | | | |
| Shaanxi Province | | 1999 | | 1998 | 2000 | | | |
| Provincial Level | | | | | 1 copy machine,<br>1 multi-projector,<br>1 refrigerated truck | | | |
| Prefecture/ County | Prefecture (10) | 1 refrigerated truck<br>1 freezer room ('00) | | 11 copy machines | | | | |
| | County (107) | 74 pickup ('99),<br>107 OHPs ('98) | | | | | | |
| Township / Village Level | | | | | | | | |
| Gansu Province | | 1999 | 1999 | 1999 | | 1999-2002 | | |
| Provincial Level | | | | 1 freezer<br>5 refrigerators | | 1 vehicle | | |
| Prefecture/ County | Prefecture (14) | 1 cold room | 2 pickup trucks | 1 cold room<br>18 freezer rooms<br>80 refrigerators | | | | |
| | County (86) | 25 OHPs | | | | | | |
| Township / Village | Town (380), Village (3985) | | | 317 freezers<br>228 refrigerators | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Qinghai Province | | | 1998 - | | 1999 - | 1998 - / 1999-2002 / 2001-2003 | | |
| Provincial Level | | | For controlling neonate tetanus:<br>4 computers<br>60 refrigerators<br>41 freezers<br>940 autoclaves<br>23700 syringes<br>29000 needles | | 1 refrigerated truck<br>1 computer<br>1 copy machine<br>1 projector | | (WHO information)<br>1 cold room,<br>1 freezer room,<br>1 refrigerated truck<br>1 surveillance vehicle<br>800 thermometers | |
| Prefecture/ County | Prefecture (8) | | | | | 6 computers<br>1 vehicle<br>TT vaccine : 921,959 | 68 freezers, 8ice-line refrigerators (large),<br>47 refrigerators for icepacks, | |
| | County (43) | | | | | 167 ice-line refrigerators,<br>167 freezers,<br>167 voltage regulators,<br>167 cold boxes,<br>1163 vaccine carriers,<br>4652 spare ice packs,<br>334 thermometers | 290 ice-line refrigerators (small),<br>140 cold boxes,<br>65 voltage regulators | |
| Township/Village | Town (167), Village (1163) | | | | | | 4,600 vaccine carriers,<br>18,400 spare ice packs,<br>770 solar-type sterilizers,<br>46,200 syringes<br>(According to Qinghai Province report, the following were procured in 2001:)<br>165 ice-line refrigerators,<br>283 freezers,<br>140 cold boxes,<br>140 ice packs | |
| Ningxiahuizu | | 1999 - 2000 | | | | 1999 - 2002 | | 2000 |
| Provincial Level | | | | | | 2 computers<br>1 vehicle | | |
| Prefecture/ County | Prefecture (4) | | | | | | | 19 freezers<br>7 refrigerators |
| | County (24) | 3 pickup trucks | | | | | | 39 freezers<br>151 refrigerators |
| Township/Village | Town (134), Village (930) | | | | | 134 ice-line refrigerators,<br>134 freezers,<br>134 cold boxes,<br>930 vaccine carriers,<br>3,720 spare ice packs,<br>256 thermometers | | |
| Xinjiang Uygur | | | | 1999 | | | | |
| Provincial Level | | | | | | | | |
| Prefecture/ County | Prefecture (15) | | | 72 vaccine–carrying vehicles,<br>122 refrigerators<br>(25 for prefectures,<br>79 for counties) | | | | |
| | County (96) | | | | | | | |
| Township / Village | Town (134), Village (930) | | | | | | | |

As for vehicles, despite some procurement through the donation of UNICEF and AusAID, as well as by using the budget of the MOH and the governments of the province and autonomous regions, they are absolutely insufficient. In Xinjiang uygur autonomous region, the largest provincial-level administrative prefecture in China, vaccines need to be transported to a location that is as far as 2,000km away once in a harsh natural environment where the temperature varies considerably between summer and winter. Such hostile geographical conditions in Xinjiang uygur autonomous region are shortening the quantity of vehicles linking the cold chain of autonomous region – prefectures- county –township/village, and causing a serious shortage of vehicles. Because of the harsh geographical conditions of Guizhou province, where 95% of the land is mountainous, it is

terribly backward in traffic facilities in this region and vaccine-transporting vehicles cannot help driving on bad tortuous roads for an extreme long time. It makes vehicles easily out of order and under the influence of shortage of vehicles, there is a tendency to lower the rate of immunization in this region compared to the rate in other provinces.

In addition, Xinjian uygur autonomous region and Guizhou province are among the most poverty provinces in China and is far behind other provinces in economical situation. So it is often in difficulties with execution of Immunization programme. Under these circumstances, the World Bank has donated cold-chain equipment to Xinjiang uygur, Guizhou, and other provinces under the 7th Health Loan Project, which, however, supplied equipment for only 50% of counties and township in these regions but was not able to cover whole area, and is failing to ensure Immunization program in the target population in many regions.

Shanxi, Shaanxi, Gansu, and Qinghai provinces and Ningxia hui autonomous region are also the most economically underdeveloped regions in China, and the majority of their population suffers from poverty. Thus, each province or region has barely enough a budget for procurement of vaccines and personnel expenses to purchase vaccines and employ personnel to carry out the Immunization program, but cannot replace or install cold-chain equipment on its own account. Therefore, in order to improve the immunization rates in these regions, it is in urgent need of appropriate supply of cold-chain equipment .

Since the year of 2000, the Project for Improvement of Immunization program, as project-type technical cooperation, was started by assistance of the Japanese government and in the target area of this project, such as in Shanxi, Shaanxi, Gansu, and Qinghai provinces and Ningxia hui autonomous region, the training for medical personnel to achieve

safety injection practices has been progressed and it is needed very strongly for improving staff training to supply equipment. Although on the provincial level, the equipment for training has been newly provided or already replaced by the budget of the Japan's Project-Type Technical Cooperation and/or MOH, equipment for the Prefectures to train county-level staff and for the counties to train township/village-level staff has not been procured yet. Thus, if this grant aid project is implemented coincident with project-type technical cooperation and provide training equipment to prefecture level, a synergistic effects by two projects will be expected.

The western regions is the target area of the policy of Large-scale development of China's western region, in where the Government of the People's Republic of China concentrate on developing and improving of life condition and at the same time, WHO and UNICEF are also considering how to accelerate EPI program in this area.

Under these circumstance, the government of the People's Republic of China requested the Government of Japan to extend assistance for procuring necessary equipment to ensure the implementation of EPI program in these seven Provinces and autonomous regions, as well as in Beijing. The contents of the requested equipment and target provinces are shown in Table 1-2 below.

Table 1-2: List of Equipment Requested by China

| Level | Province | No. of administrative districts QTY | Copy machine QTY | Multimedia projector QTY | OHP QTY | Refrigerator truck QTY | 4-m3 refrigerator truck | Freezer room QTY | Cold room QTY | DNA sequencer QTY |
|---|---|---|---|---|---|---|---|---|---|---|
| Beijing | | | 3 | 2 | | | | | | 1 |
| Province | Shanxi | 1 | 1 | 1 | | | | | | |
| | Shaanxi | 1 | 1 | 1 | | | | | | |
| | Gansu | 1 | 1 | 1 | | | | | | |
| | Guizhou | 1 | 0 | 0 | | | | | | |
| | Qinghai | 1 | 1 | 1 | | | | | | |
| | Ningxiahuizu | 1 | 1 | 1 | | | | | | |
| | Xingjiangweiwuerzu | 1 | 0 | 0 | | | | | | |
| | **Subtotal** | 7 | 8 | 7 | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Prefecture | Shanxi | 11 | 11 | 11 | | 3 | | 10 | 8 | |
| | Shaanxi | 10 | 10 | 10 | | 4 | | 8 | 6 | |
| | Gansu | 14 | 14 | 14 | | 4 | | 12 | 2 | |
| | Guizhou | 9 | 0 | 0 | | 3 | | 9 | 2 | |
| | Qinghai | 8 | 8 | 8 | | 3 | | 8 | 7 | |
| | Ningxiahuizu | 4 | 4 | 4 | | 3 | | 4 | 4 | |
| | Xingjiangweiwuerzu | 15 | 0 | 0 | | 4 | | 5 | 4 | |
| | **Subtotal** | 71 | 47 | 47 | | 24 | | 56 | 33 | |
| County | Shanxi | 119 | | | 119 | | 18 | | 30 | |
| | Shaanxi | 107 | | | 107 | | 14 | | 25 | |
| | Gansu | 86 | | | 86 | | 11 | | 15 | |
| | Guizhou | 86 | | | 0 | | 10 | | 25 | |
| | Qinghai | 43 | | | 43 | | 17 | | 10 | |
| | Ningxiahuizu | 24 | | | 24 | | 10 | | 4 | |
| | Xingjiangweiwuerzu | 96 | | | 0 | | 15 | | 25 | |
| | **Subtotal** | 561 | | | 379 | | 95 | | 134 | |
| Total | | | 58 | 56 | 379 | 24 | 95 | 56 | 167 | 1 |

# Chapter 2 Contents of the Project

## 2-1 Basic concept of the Project

The Government of the People's Republic of China has decided to include Hepatitis-B vaccination in routine immunization plan in China and set the goal to lower the morbidity of preventable infectious diseases, due to increasing the rate of routine immunization for all children.

This project aims to increase vaccination rate by improving vaccine storage conditions correctly as the result of replacement of deteriorated cold chain equipment more than 20 years old and by improving transport system of vaccines efficiently due to supplying vehicles to deliver vaccines. It will be covered all disease control center in prefectures and counties of 7 Western provinces which is behind other regions of economical development. It will finally back up to achieve National Health Plan in China. At the same time, the project aims to assist in ensuring implementation of EPI program by providing training equipment for safety injection and/or surveillance that will be progressed by Japan's Project-Type Technical cooperation. It will be also expected to assist in sustenance of Polio-free in China.

## 2-2 Basic Design of the Requested Japanese Assistance

### 2-2-1 Design Policy

(1) Basic Policy

1) Target Areas and Facilities

The target areas and facilities of this project consist of Beijing City (National Polio

Laboratory) and 71 prefectural epidemic prevention stations and 561 county epidemic prevention stations in seven provinces and autonomous regions (Five provinces; Shanxi, Guizhou, Shaanxi, Gansu, and Qinghai and two autonomous regions; Ningxiahuizu and Xinjiang uygur), which encompass many poverty areas and have been struggling to replace its cold-chain equipment because of insufficient budget and lack of support from donor organizations.

2) Items to be Procured

a) Cold-Chain Equipment

This project will replace severely deteriorated equipment that was procured during the early 1980s and is in urgent need of replacement. The items to be procured include CFC[*1]-free prefabricated freezer rooms, prefabricated cold rooms, 300-liter electric refrigerators, cold boxes, and their spare parts. Taking into account the quantity of equipment and the geographical conditions of the installation sites, the freezer and cold rooms will be of prefabricated types that can be easily assembled and installed by the cold-chain maintenance staff of epidemic prevention stations on their own budget.

The Standard of distribution of Cold chain equipment is shown in Table 2-1.

Table 2-1. The Standard of Distribution of Cold-Chain Equipment

| Administrative Level | Equipment | Application | Capacity & Quantity |
|---|---|---|---|
| Prefecture | [Population: 5 million or more] | | |
| | Freezer room | Stores 6-month supplies of polio & measles vaccines. | 15 $m^3$ x 1 |
| | Cold room | Stores 6-month supplies of BCG, DTP, Hepatitis-B vaccines. | 15 $m^3$ x 1 |
| | Refrigerated truck | Transports vaccines to lower-level administrative facilities. | 15 $m^3$ x 1 |
| | | | |

[*1] CFC: Chrolo-Fuluoro-Carbon, one of the ozone depleting substances used as a refrigerant. It is regulated as the target substances that destroy the Ozone Layer under the 1987 Montreal Protocol.

| | | | |
|---|---|---|---|
| | [Population: 3-5 million]<br>Freezer room<br>Cold room<br>Refrigerated truck | <br>Stores 6-month supplies of polio & measles vaccines.<br>Stores 6-month supplies of BCG, DTP, Hepatitis-B vaccines.<br>Transports vaccines. | <br>8 $m^3$ x 1<br>15 $m^3$ x 1<br>10 $m^3$ x 1 |
| | | | |
| | [Population: 3 million or less]<br>Freezer room<br>Cold room<br>Refrigerated truck | <br>Stores 3-month supplies of polio & measles vaccines.<br>Stores 3-month supplies of BCG, DTP, Hepatitis-B vaccines.<br>Transports vaccines. | <br>8 $m^3$ x 1<br>8 $m^3$ x 1<br>10 $m^3$ x 1 |
| | | | |
| County | [Population: 0.4 million or more]<br>Freezer<br>Refrigerator<br>Vaccine-transport vehicle | <br>Stores 3-month supplies of polio & measles vaccines.<br>Stores 3-month supplies of BCG, DTP, Hepatitis-B vaccines.<br>Transports vaccines. | <br>300L x 1<br>300L x 1<br>1 |
| | | | |
| | [Population: less than 0.4 million]<br>Freezer<br>Refrigerator<br>Vaccine-transport vehicle | <br>Stores 3-month supplies of polio & measles vaccines.<br>Stores 3-month supplies of BCG, DTP, Hepatitis-B vaccines.<br>Transports vaccines. | <br>300L x 1<br>300L x 1<br>1 |

Note: The Standard of Distribution was based on the volume of vaccines calculated by the number of target population and storage period.

b) Vehicles

The frequency of vaccine transportation and the monthly average transport distance in each Province are shown in Table 2-2. While there are some differences in the average transport distance, it is not a rare case to take one or more days to transport vaccines because prefectural epidemic prevention stations have to transport vaccines to all county level epidemic prevention stations in wide area. In mountainous areas, roads are usually winding paths along the mountains and it makes the actual travel distance much longer than the objective distance on the map. Also, since a relatively large quantity of vaccines is transported at once under extremely high temperature in summer and/or low temperature in winter, they must be transported in

strictly controlled condition, not affected by a change of outside temperature. To ensure this, refrigerated trucks will be provided for 24 prefectural epidemic prevention stations that are currently renting buses and other vehicles for vaccine transportation.

On the other hand, the total distance covered by vehicles of county epidemic prevention stations is finally very long because there are many target places in township where county epidemic prevention stations have to provide vaccines, nevertheless each area controlled by county epidemic prevention stations is rather small. In such small area, it is very easy for vehicles to visit many sites at one time, and quantity of vaccines delivered by vehicles is very small compare to in prefecture, therefore a pickup truck with cold boxes and icepacks is useful for delivery of vaccines. Using Pickup truck is a great advantage on transportation of technicians for maintenance of cold chain equipment and medical personnel for surveillance. Therefore, pickup trucks with cold boxes and icepacks will be provided for each county epidemic prevention stations.

Table 2-2: Frequency and Distance of Vaccine Transportation in each Province

| Area | No. of administrative districts | Frequency | | Distance | | |
|---|---|---|---|---|---|---|
| | | Average No. of transportation | Max. No. of trips/month | Monthly average travel distance (km) | Monthly max. travel distance (km) | Remark |
| **Shanxi Province** | | | | | | |
| Province→Prefecture | 11 | 3 | 8 | 3,000 | 24,000 | |
| Prefecture→County | 119 | 6 | 17 | 600 | 1,800 | |
| County→Town/Village | 1,786 | 6 | 30 | 300 | 300 | |
| **Shaanxi Province** | | | | | | |
| Province→Prefecture | 10 | 1.5 | 2 | 350 | 650 | |
| Prefecture→County | 107 | 1.5 | 2 | 175 | 300 | |
| County→Town/Village | 2,025 | 1.5 | 3 | 50 | 100 | |
| **Gansu Province** | | | | | | |
| Province→Prefecture | 14 | 0.5 | 2 | 5,078 | 5,078 | |
| Prefecture→County | 86 | 1 | 2 | 35,000 | 400,000 | Total |

| | | | | | | |
|---|---|---|---|---|---|---|
| County→Town/Village | 1,562 | 1 | 2 | 40,000 | 8,000,000 | Total |
| Area | No. of administrative districts | Frequency | | Distance | | |
| | | Average no. of transportation | Max. no. of trips/month | Monthly average travel distance (km) | Monthly max. travel distance (km) | Remark |
| **Ningxiahuizu** | | | | | | |
| Province→Prefecture | 4 | 0.66 | 2 | 800 | 960 | |
| Prefecture→County | 24 | 0.66 | 2 | 400 | 600 | |
| County→Town/Village | 304 | 1 | 2 | 200 | 400 | |
| **Qinghai Province** | | | | | | |
| Province→Prefecture | 8 | 0.33 | 2 | 5,000 | | |
| Prefecture→County | 43 | 1 | 1 | 16,000 | | Total |
| County→Town/Village | 440 | 1 | 1 | 67,000 | | Total |
| **Guizhou Province** | | | | | | |
| Province→Prefecture | 9 | 2.6 | 3 | 1,400 | 1,500 | |
| Prefecture→County | 86 | 16 | 35 | 10,098 | 13,534 | Total |
| County→Town/Village | 1,463 | 3 | 3 | 1,214 | 2,212 | |
| **Xinjiangweiwuerzu** | | | | | | |
| Province→Prefecture | 15 | 0.33 | 2 | 4,000 | | |
| Prefecture→County | 96 | 0.5 | 2 | 1,000 | | |
| County→Town/Village | 876 | 1 | 2 | 400 | | |

c) Training Equipment

In the EPI project, county-level staff is convened at prefectural health bureaus to receive training. Training materials are distributed, and their contents are displayed on a multimedia projector screen, based on that the staff learns basic techniques and manipulation. Under the plan, those trained on the county level will then summon township/village-level immunization staff to their respective county health bureaus to give training using OHPs (overhead projectors). To facilitate these activities, this project will provide one copy machine for producing educational materials and one multimedia projector for each of 47 prefectures in five provinces and autonomous regions (Shanxi, Shaanxi, Gansu, Ningxiahuizu, and Qinghai) that are the target areas of the Project for Improvement of Immunization Program of Japan, as well as one OHP for each of 379 counties of the five provinces and autonomous regions.

d) DNA Sequencer

A capillary-system DNA sequencer will be set in the National Polio Laboratory.

(2) Policy on Natural Environment

Temperatures rise above 30˚C in summer in many target areas, such as Xinjiang uygur autonomous region and transportation of vaccines often takes one or more days. Thus, the refrigerated trucks procured under this project will have an external power source to maintain the suitable temperature for storage of vaccines in the storage room during long-distance transportation.

Temperatures would fall below –20˚C in some areas during winter. To minimize the influence of such low outside temperature, appropriate insulators shall be selected as the panel of the storage room of refrigerated truck. Gasoline and diesel engine pickup trucks will be procured and will be distributed to the target facility in consideration of the climatic condition of each area.

(3) Policy on Socioeconomic Condition

As shown in Table 2-1 Cold –Chain Distribution Standard, vaccine storage on prefecture level will need a storage capacity equivalent to those of freezer and cold rooms. Normally, freezer and cold rooms shall be designed individually according to the conditions of the installation sites, such as the conditions of the distribution board and electric cables, presence of drainage for cooling water, and temperature/humidity control. However, such individual designing and installation could be so expensive that the requested quantity by the Chinese side could not be procured within the budget. On the other hand, simple prefabricated unit panels for freezer rooms and cold rooms are manufactured in China, and they are distributed in combination with cooling units produced in third country as good-quality, low price products. In addition, since MOH has an experience in assembling such products in a similar project in Japanese FY 1998, this project will also procure prefabricated freezer rooms and cold rooms.

(4) Policy on Employing Local Vendors

As for the refrigerators, vehicles, multimedia projectors, OHPs, and a DNA sequencer, the manufacturers' local distributor or agent is situated in the capital of each target Province to provide spare parts, reagents for the DNA sequencer, and after sales service without any inconvenience.

(5) Policy on the Operation/Maintenance Capability of the Implementing Agency

Prefabricated freezer rooms and cold rooms can be assembled by the skilled maintenance personnel of each prefectural epidemic prevention station. Thus, the freezer room and cold room kits will be handed over at the provincial warehouse in each provincial capital, and Japanese side will not undertake the installation work. Vehicles made in China will be handed over to the Chinese side at their factories, and vehicles made in Japan at the designated ports.

**2-2-2 Basic Plan**

(1) Contents of Equipment

Based on discussions with the representatives of MOH, the contents of the equipment to be procured under this project is shown in Table 2-3 and Table 2-4. Although the initial request included educational equipment (copy machine and multimedia projector) for training provincial-level staff, they were excluded from this project as they have already been provided for each province under the project type technical cooperation.

## Table 2-3: Contents of Equipment to be Procured

| Equipment | | Specification, dimension, application | Unit price (1000 yen) | Qty. | Subtotal (1000 yen) |
|---|---|---|---|---|---|
| 1 | Prefabricated freezer room kit (15 $m^3$) | Interior capacity: 15 $m^3$, Temp: -20˚C (outside temp. + 43˚C), Freezer output: 1.8kW+, Panel: polyurethane or other insulating materials (density: 40kg/ $m^3$), Thickness: 100mm or more, Refrigerant: HFC<br>For storing vaccines at Prefectural Epidemic Prevention Stations. | 403 | 4 | 1,612 |
| 2 | Prefabricated freezer room kit (8 $m^3$) | Interior capacity: 8 $m^3$, Temp: -20˚C (outside temp. + 43˚C), Freezer output: 1.8kW+, Panel: polyurethane or other insulating materials (density: 40kg/ $m^3$), Thickness: 100mm or more, Refrigerant: HFC<br>For storing vaccines at Prefectural Epidemic Prevention Stations. | 339 | 52 | 17,628 |
| 3 | Prefabricated cold room kit (15 $m^3$) | Interior capacity: 15 $m^3$, Temp: +2~+8˚C (outside temp. + 43˚C), Production output: 1.5kW+, Panel: polyurethane or other insulating materials (density: 40kg/ $m^3$), Thickness: 100mm or more, Refrigerant: HFC, For storing vaccines at Prefectural Epidemic Prevention Stations. | 356 | 6 | 2,136 |
| 4 | Prefabricated cold room kit (8 $m^3$) | Interior capacity: 8 $m^3$, Temp: +2~+8˚C (outside temp. + 43˚C), Production output: 1.1kW+, Panel: polyurethane or other insulating materials (density: 40kg/ $m^3$), Thickness: 100mm or more, Refrigerant: HFC, For storing vaccines at Prefectural Epidemic Prevention Stations. | 285 | 27 | 7,695 |
| 5 | Electric refrigerator (300 liter) | Type: chest-type electric refrigerator, Vaccine storage capacity: 300+ liter, Inside temp: +2~+9˚C (w/temp. regulator & thermometer), Attached refrigerant: HFC, For storing vaccines at Prefectural Epidemic Prevention Stations. | 34 | 134 | 4,556 |
| 6 | Refrigerated truck | Capacity: 10 $m^3$, Temp. setting: -20~+8˚C (@outside temp. + 53˚C), Refrigerant: HFC equivalent, Tire diameter: 215+mm, Comes with temp. recorder & regulator, For transporting vaccines from Prefecture to county-level facilities. | 3,046 | 24 | 73,104 |
| 7 | Pickup truck (gasoline) | 4WD, Double cabin, Tire diameter: 215+mm, Comes with A/C, hood (sheet), 1 spare tire, and spare parts, For transporting vaccines from Country Epidemic Prevention Stations and for surveillance activities in cold districts. | 1,988 | 32 | 63,616 |
| 8 | Pickup truck (diesel) | 4WD, Double cabin, Tire diameter: 215+mm, Comes with A/C, hood (sheet), 1 spare tire, and spare parts, For transporting vaccines from Country Epidemic Prevention Stations and for surveillance activities | 2,068 | 63 | 130,284 |
| 9 | Cold box | Capacity: 15+ liters, Outer dimension: approx. 640x500x450mm, Should be able to contain 12 or more icepacks. | 15 | 190 | 2,850 |
| 10 | Copy machine | Desktop type, Can handle A4 & A3 papers, Copy speed: approx. 20 A4 sheets/min., Reduction/enlargement: 50~200%, AC200V, 50 Hz, For making training materials for the vaccination staffs of County Epidemic Prevention Stations. | 208 | 47 | 9,776 |
| 11 | Multimedia projector | Resolution: 800x600, Brightness: 1000 lumen, Projection size: 30~200 inches, Projection distance: 1.4~8m, Contrast: 300:1, For training vaccination staffs of County Epidemic Prevention Stations. | 369 | 47 | 17,343 |
| 12 | OHP | Desktop type using reflective projection method w/spare lamps, Projection lens: approx. 300mm, Brightness: approx. 2000 lumen, For training vaccination staffs of County Epidemic Prevention Stations. | 21 | 379 | 7,959 |
| 13 | DNA sequencer | Sequence analysis software for PC (Windows NT) for studying DNA sequence with color printer and expendables, Will be used at National Polio Laboratory. | 12,678 | 1 | 12,678 |

Table 2-4: Quantity of Equipment to be Procured and Basis of Calculation

| Item | | Planned Qty. | Installation Site | | | Plan & Basis of Calculation |
|---|---|---|---|---|---|---|
| | | | A | B (71) | C (561) | |
| 1 | Prefabricated freezer room kit (15 $m^3$) | 4 | 0 | 4 | 0 | Existing equipment at Prefectural Epidemic Prevention Stations that were introduced in the early 1980s and are in urgent need will be renewed in the quantity (4 units) appropriate for the population size of each Prefecture. |
| 2 | Prefabricated freezer room kit (8 $m^3$) | 52 | 0 | 52 | 0 | Existing equipment at Prefectural Epidemic Prevention Stations that were introduced in the early 1980s and are in urgent need will be renewed in the quantity (52 units) appropriate for the population size of each Prefecture. |
| 3 | Prefabricated cold room kit (15 $m^3$) | 6 | 0 | 6 | 0 | Existing equipment at Prefectural Epidemic Preventions Centers that were introduced in the early 1980s and are in urgent need will be renewed in the quantity (6 units) appropriate for the population size of each Prefecture. |
| 4 | Prefabricated cold room kit (8 $m^3$) | 27 | 0 | 27 | 0 | Existing equipment at Prefectural Epidemic Prevention Stations that were introduced in the early 1980s and are in urgent need will be renewed in the quantity (27 units) appropriate for the population size of each Prefecture. |
| 5 | Electric refrigerator | 134 | 0 | 134 | 0 | Will replace existing refrigerators introduced to County Epidemic Prevention Stations in the early 1980s. Higher priority districts will be provided preferentially in the quantity determined according to the procurement guidelines (134 units). |
| 6 | Refrigerated truck | 24 | | 24 | 0 | Will be provided for Prefectural Epidemic Prevention Stations to transport vaccines to other centers without refrigerated trucks (24 trucks). |
| 7 | 4WD double-cabin gasoline pickup truck (including spare parts) | 63 | 0 | 0 | 63 | Will be provided for County Epidemic Prevention Stations that either do not have trucks for vaccine transportation or have non-working aged vehicles and that requested gasoline-engine trucks (63 trucks). |
| 8 | 4WD double-cabin diesel pickup truck (including spare parts) | 32 | 0 | 0 | 32 | Will be provided for County Epidemic Prevention Stations that either do not have trucks for vaccine transportation or have non-working aged vehicles and that requested diesel-engine trucks (32 trucks). |
| 9 | Cold box | 190 | 0 | 0 | 190 | Will be provided for County Epidemic Prevention Stations. 2 ice boxes for each pickup truck (190 boxes). |
| 10 | Ice pack | 9,120 | 0 | 0 | 9,120 | Will be provided for County Epidemic Prevention Stations. 48 ice packs for each cold box (9,120 packs). |
| 11 | Copy machine | 47 | 0 | 47 | 0 | Will be provided for Prefectural Epidemic Prevention Stations for making educational materials for training the Centers' staff members in conjunction with the project-type technical cooperation. One machine for each target Province, except for Guizhou and Xinjiang Uygur (47 units). |
| 12 | Multimedia projector | 47 | 0 | 47 | 0 | Will be provided for Prefectural Epidemic Prevention Stations as a learning aid for training the Centers' staff members in conjunction with the project-type technical cooperation. One machine for each target Province, except for Guizhou and Xinjiang Uygur (47 units). |
| 13 | OHP | 379 | 0 | 0 | 379 | Will be provided for County Epidemic Prevention Stations as a learning aid for training the Centers' staff members in conjunction with the project-type technical cooperation. One machine for each target Province, except for Guizhou and Xinjiang Uygur (379 units). |
| 14 | DNA sequencer | 1 | 1 | 0 | 0 | Will be installed at the National Polio Laboratory to replace the existing one, the production of which has discontinued, and the production of its reagents will also discontinue in the near future. |

A: National Polio Laboratory, B: Prefectural Epidemic Prevention Station, C: County Epidemic Prevention Station

(2) Disposition of Each Equipment Item

Table 2-5 on the following page shows the disposition of each equipment that was determined based upon the discussions with MOH.

The possible supply sources of the main equipment items are shown in table 2-6.

Table 2-6: Sources of Equipment

| Equipment | | China | Japan | 3rd country |
|---|---|---|---|---|
| 1 | Prefabricated freezer room kit (15 $m^3$) | √ | | √ |
| 2 | Prefabricated freezer room kit (8 $m^3$) | √ | | √ |
| 3 | Prefabricated cold room kit (15 $m^3$) | √ | | √ |
| 4 | Prefabricated cold room kit (8 $m^3$) | √ | | √ |
| 5 | Electric refrigerator (300 liter) | √ | | |
| 6 | Refrigerated truck | √ | | |
| 7 | Pickup truck (gasoline) | √ | | |
| 8 | Pickup truck (diesel) | √ | | |
| 9 | Cold box | √ | | |
| 10 | Ice Pack | √ | | |
| 11 | Copy machine | √ | | |
| 12 | Multimedia projector | √ | | |
| 13 | OHP | √ | | |
| 14 | DNA sequencer | √ | | |
| Ratio | | 96.2% | 0.0% | 3.8% |

### 2-2-3 Procurement Plan

#### 2-2-3-1 Procurement Policy

Equipment for this project will be procured from suppliers in China, Japan, or third countries that will be selected through a public tender organized by a Japanese consultant firm. Equipment procured in Japan or third countries will be inspected by a third party inspection organization before shipment. As for the installation, setup, and initial operation of prefabricated freezer room kits and cold room kits, as well as for the initial setting of the DNA sequencer, their manufacturers will dispatch engineers to the project sites to provide guidance.

The Health Bureau and epidemic prevention station of each province are in charge of the implementation of this project and responsible for the distribution, maintenance, and the control of the equipment.

#### 2-2-3-2 Implementation Conditions

From the experience, MOH recognizes that some pickup trucks made in China don't have good performance and wishes to import Japanese automobiles instead. To accommodate their wishes, the project will expand possible sources of pickup trucks to include those manufactured by Chinese-Japanese joint ventures, however, specifications of such trucks must be examined carefully.

#### 2-2-3-3 Scope of Works

Table 2-7 shows the procurement and installation works to be undertaken by the Chinese and Japanese sides respectively. The Chinese side is responsible for controlling and delivering all the equipment items from the places of handover*, such as Beijing and Taiyuan, to each epidemic prevention station.

Table 2-7: Division of Work

| Party | Contents |
|---|---|
| Japan | Procurement of equipment.<br>Transportation of equipment to the places of handover. |
| China | Distribution of equipment from handover points to target facilities.<br>Assembly of prefabricated cold/freezer rooms.<br>Guidance on the operation and maintenance of equipment. |

*The place of handover: Taiyuan City (Shanxi Province), Xi'an City (Shaanxi Province), Lanzhou City (Gansu Province), Yinchuan City (Ningxiahuizu), Xining City (Qinghai Province), Urumqi City (Xinjiangweiwuerzu), Guiyang City (Guizhou Province), and Beijing City

#### 2-2-3-4 Consultant Supervision

Two procurement supervisors will be dispatched from Japan to oversee the acceptance inspection, sorting out, handover, etc. of equipment and materials to be procured in China.

#### 2-2-3-5 Quality Control Plan

Main cold-chain equipment items shall meet WHO's standards (PIS) or of equivalent specifications and will be free of CFCs.

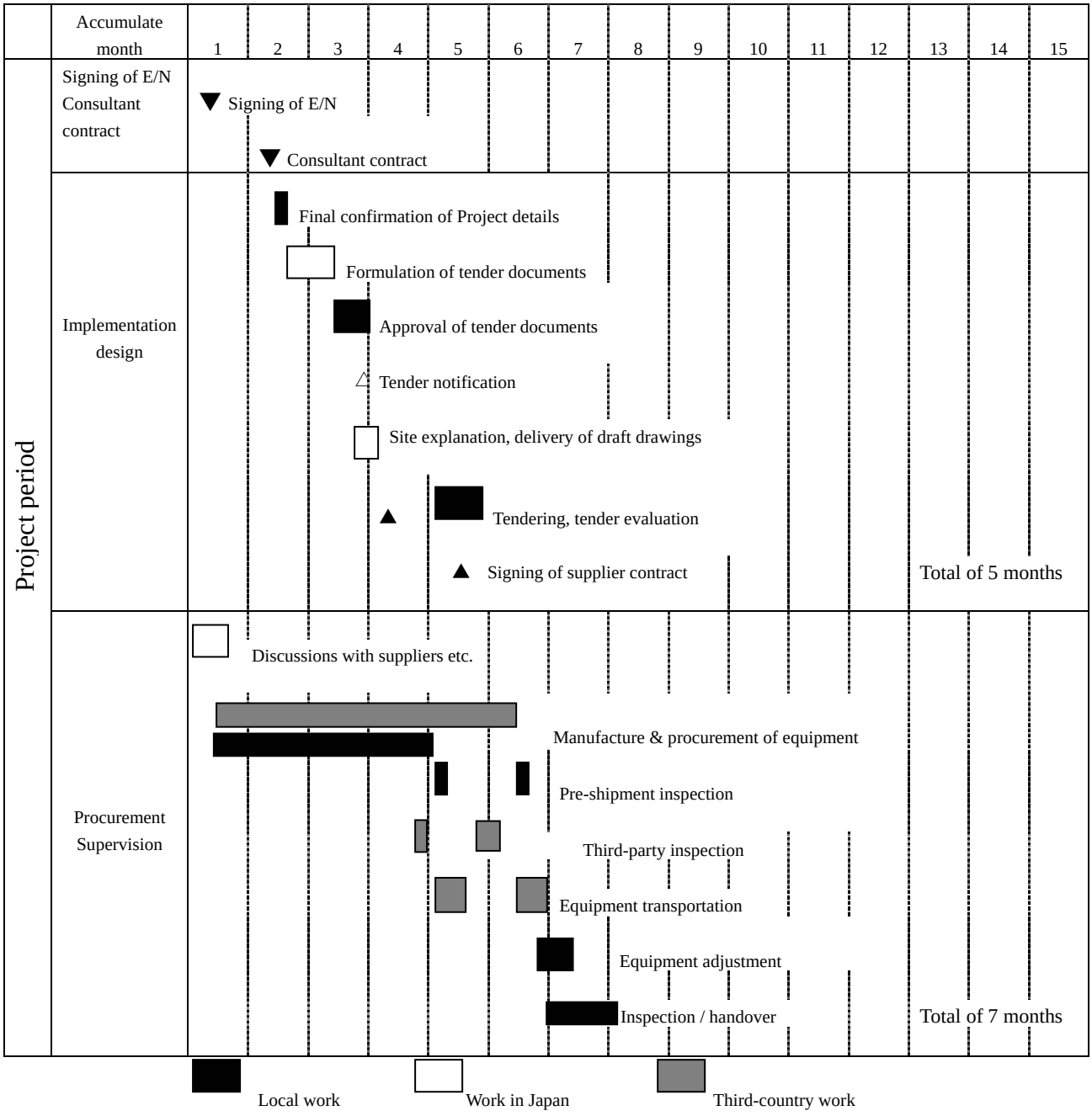
#### 2-2-3-6 Procurement Plan

Cooling units for the prefabricated cold/freezer rooms and the refrigerated trucks will be procured from Japan or a third country, as they are not manufactured in China. They will be unloaded in Tianjin port and from there transported by land to Taiyuan city in Shanxi province, Xi'an city in Shaanxi province, Lanzou city in Ganzu province, Yinchuan city in Ningxia hui autonomous region, Xining city in Guizhou province, and Beijing city. Other items will be sourced from China or Japan in principle. Although automobile spare parts can be purchased from the distributors in China, it may take a long time to obtain them at significantly larger costs. Thus, a two-year supply of necessary spare parts will be procured along with the vehicles. For the prefabricated freezer and cold rooms and the refrigerators, necessary spare parts will be procured in the quantities recommended by their manufacturers.

### 2-2-3-7 Implementation Schedule

This project will be implemented in a twelve-month period (See Table 2-8).

Table 2-8: Implementation Schedule



## 2-3 Obligations of Recipient Country

The responsibilities of the Chinese side in connection with the implementation of this project are as follows:

1) To carry out proper customs clearance procedures promptly with regard to the materials and equipment to be procured under this project and take necessary measures for exempting domestic materials and equipment from value added tax (VAT).

2) To secure sufficient warehouse spaces for storing the materials and equipment.

3) To transport the materials and equipment from the warehouses to their final destinations without delay and bear associated expenses.

4) To distribute and assemble the prefabricated cold/freezer rooms without delay.

5) To pay service fees associated with the issuance and payment of the Authorization to Pay (A/P) according to the Banking Arrangements (B/A) for this project.

6) To make necessary appropriations and employ personnel for the proper operation and maintenance of the materials and equipment to be procured.

7) To determine the installation sites of the cold/freezer rooms and submit layout plans thereof.

## 2-4 Project Operation Plan

The cold-chain equipment to be procured under this project will be distributed to the prefectural and country epidemic prevention stations and used mainly for storing vaccines. The assembly of the prefabricated freezer and cold rooms is estimated to take about three months in each province.

Vaccines procured by and stored at the Immunization Program Department of the Health

Bureau of each province will be transported to each prefectural epidemic prevention station and stored in their freezer and/or cold rooms, which are managed by three staffers who are assigned to vaccine acceptance, dispensing, and temperature control. Vaccines are delivered to the county epidemic prevention stations once in about two months (or once a month in some areas or once in three months during winter in cold areas). A few maintenance personnel are assigned in each prefectural and county epidemic prevention station, as well as vaccine control staff, who can manage simple repair work. Complicated repair work will be done by maintenance engineers who are dispatched from the provincial-level to prefecture/county level facilities. Repair work that requires sophisticated technical servicing will be entrusted to the agents of cold-chain equipment situated in each provincial capital.

Each prefecture and county epidemic prevention station employs at least two drivers. And vaccine delivery records, such as destinations and usage of vehicles, are kept by each driver. Local distributors of the vehicles are situated in each provincial capital and are easily accessible to receive repair services.

Training equipment will be used in the training activities to be carried out under Japan's project-type technical cooperation. Many agents or distributors of each equipment items are located within China that can readily supply spare parts or repair services.

Based on the above, the current personnel and technical capabilities of the project sites and their supporting systems are deemed to be sufficient for proper operation and maintenance.

In addition, reduction of financial burden can be expected through the implementation of the project, as renewing of the existing equipment will improve energy efficiency, thereby reducing utility and repair costs. The operation and maintenance costs of the epidemic prevention stations that currently do not have vehicles will not increase because they have been paying for the rental fees and fuel costs of buses and have already employed drivers.

# Chapter 3 Project Evaluation and Recommendation

## 3-1 Project Effects

1) Direct Effects

i) Implementation of this project will enable the storage of 16.1 million doses of vaccines annually under proper temperature ranges for 2.3 million infants under one year old, who are subjects of regular immunization programs. This will ensure more effective vaccination.

ii) The quick identification and effective detection of polio virus in the cases will be enable and it will make easy to ascertain whether the origin of virus caused Polio cases belong to vaccine-derived Polio virus (VDPV) or wild strain of Polio virus imported from other countries. Consequently it will make possible to know how to prevent recurrence of outbreak of Polio.

iii) Training aided by educational equipment will ensure safe injection practices, which will prevent secondary infection and improve health/medical services for the local residents.

2) Indirect Effects

i) Renewal of deteriorated equipment will reduce the need for maintenance work and associated costs.

ii) Appropriate and regular immunization will reduce the morbidity rates of measles and other vaccine preventable diseases among the infants who are the beneficiaries of this project and eventually lower the infant mortality rate in the target regions.

iii) Sustenance of the polio-free state by China will contribute to the eradication of polio from Asia and the world.

## 3-2 Recommendations

MOH is recognized to be highly capable of implementing this project. However, the effects

of the project will be enhanced even further if the Chinese side will consider the following points:

1) To take necessary measures to ensure smooth assembly and installation of the prefabricated freezer and cold rooms.
2) To foster engineers by giving guidance on the proper operation, maintenance, and repair of each equipment item, even though the staff has previous experiences in using most items.
3) To replace all the existing items using CFCs, which can aggravate the depletion of the ozone layer if released in the air by improper disposal. Thus, in scrapping the existing equipment, additional assistance may be necessary to ensure proper collection and disposal of CFCs gases.