NO

BASIC DESIGN STUDY REPORT

ON

THE PROJECT FOR INFECTIOUS DISEASE CONTROL

IN

THE KINGDOM OF CAMBODIA

July 2005

Japan International Cooperation Agency

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PREFACE

In response to a request from the Royal Government of Cambodia, the Government of Japan decided to conduct a basic design study on the project for Infectious Disease Control, and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Cambodia a study team February to March, 2005.

The team held discussions with the officials concerned of the Royal Government of Cambodia, and conducted a field survey at the study area. After the team returned to Japan, further studies were made. Then the present report was finalized.

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 Royal Government of Cambodia for their close cooperation extended to the team.

July 2005

Seiji Kojima

Vice-President

Japan International Cooperation Agency

Location Map

Cambodia

Abbreviations

BCG	Bacillus Calmette-Guerine
CENAT	National Center for Tuberculosis and Leprosy Control
CFC	Chloro Fluoro Carbon
CMS	Central Medical Stores
DPT	Diphtheria-Pertussis-Tetanus Combined Vaccine
EPI	Expanded Program on Immunization
GDF	Global Drug Facility
HIV	Human Immunodeficiency Virus
IUATLD	International Union against Tuberculosis and Lung Disease
JICA	Japan International Cooperation Agency
MTEF	Medium Term Expenditure Framework
NIP	National Immunization Program
SIA	Supplementary Immunization Activities
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WPRO	WHO Western Pacific Region Office

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Chapter 1 Background of the Project

The Cambodian Ministry of Health in an effort to provide quality health services for the entire nation is implementing and gradually expanding nationwide activities by fortifying health services on the Health Center level under the National Strategy on Immunization 5-Year Work Plan 2001-2005, the National Health Strategic Plan for Tuberculosis Control 2001-2005, and other programs against infectious diseases.

The Kingdom of Cambodia (hereinafter to be referenced as "Cambodia") officially launched a National Immunization Program (NIP) in 1986, which expanded to all provinces by the end of 1988. However, under the subsequent political distemper, NIP activities were suspended or cut back considerably, as the procurement or periodic replacement of cold-chain equipment and vehicles, as well as the implementation of immunization campaigns, were seriously affected. For over a decade, Cambodia has been using the cold rooms, freezers, refrigerators, and vehicles that were procured under the aid of UNICEF in the early 1990s and are severely deteriorated today. The freezers and refrigerators installed in Provincial Health Districts and Operational Districts[1] were of old kerosene type with limited storage space and improper temperature control. Therefore, some regions were struggling to store sufficient quantities of vaccines to cope with population growth. The wastage[2] of measles and OPV in Cambodia are as high as 68% and 52% respectively in 2001. Improper vaccine storage due to the scarcity of cold-chain equipment was said to be responsible for the high wastage. Since many Health Centers are not equipped with refrigerators, their staffs go to their respective Operational Districts every Monday, carry a cold box to return unused vaccines and receive new ones. This was not a very efficient system and needed to be improved. Also, the rural, mountain, and marchland areas are

[1] Operational Districts are units responsible for managing 10 to 15 Health Centers as designated by the Ministry of Health. Many Operational Districts combine parts of different administrative districts. Operational District Health Office has jurisdiction over Operational Districts. Central Hospitals are positioned as referral hospitals.

[2] Vaccine wastage is a ratio of vaccine that is discarded because of breakage during transportation or nonuse. For instance, if only one person is to be immunized using a vial containing ten doses, the remaining nine doses go to waste. Thus, the wastage in this case is nine out of ten, or 90%. Vaccine wastage changes considerably depending on the packaging unit (number of doses per vial), the number of people to be vaccinated, improper temperature control of refrigerators, and various other factors.

especially struggling to continue or promote immunization activities through outreach programs[3] due to lack of vehicles for transporting vaccines and conducting outreach activities.

Table 1-1 shows the current routine immunization schedule in Cambodia.

Table 1-1: Vaccination Schedule in Cambodia

Name of vaccine	No. of doses	Timing
BCG	1	at birth
OPV	4	at birth and 6, 10, and 14 weeks
DPT[4]-Hepatitis B	3	6, 10, and 14 weeks
Hepatitis B	1	at birth
Measles	1	9 months
Tetanus	2	at the time of confirming pregnancy and 1 month after the 1st dose

Source: Ministry of Health (2004)

Measles vaccination has been given only once to infants at nine months. However, it is estimated that only 80% of children who received an initial dose of vaccine show immunity to measles because of a waning immunity over time or primary vaccine failure.

In recent years, Cambodia experienced two major outbreaks of measles in 1999 and 2000, infecting 13,827 and 12,327 people respectively according to survey reports. However, as these figures were suspected to reflect only 40 to 50% of the actual numbers of patients, the Ministry of Health was faced to take immediate actions to control the disease and conducted anti-measles campaigns for children aged 9 months to 14 years in four separate time periods between December 2000 and May 2004. The coverage rates of these campaigns were high, ranging from 80% to 103%, and the reported number of patients declined from 3,761 in 2001 to 352 in 2004. However, as some children still escaped vaccination through these campaigns and regular immunization activities, the accumulation of unimmunized persons could lead to an increase of susceptible population[5]. The Ministry of Health indicates that it is essential to conduct nation-wide campaigns in 2006 in order to achieve the country's goal[6] to eliminate measles by 2012 while maintaining

[3] Outreach activities are part of itinerant medical services, in which health workers are dispatched from Health Centers to the residential areas of the target population to give vaccination.

[4] Diphtheria-Pertussis-Tetanus Combined Vaccine

[5] Susceptible population means a population subgroup that is more sensitive to particular pathogens than the general population.

[6] This corresponds to the goal presented by WHO's Western Pacific Regional Office in July 2004 to eliminate measles from the region by 2012.

the current Phase-2 status (outbreak prevention phase)[7]as classified by WHO.

In addition, to maintain the polio-free status, additional mass immunization campaign to administer OPV to children under five needs to be conducted in the provinces bordering Thailand and other countries, from which polio virus could enter Cambodia. The sudden increase in demand for vaccines is straining the finances of the Ministry of Health.

As the immunization activities expand, the demand for syringes also increases. Cambodia introduced auto-disable syringes[8] to immunization campaigns in 1999, began using them on a trial basis in the routine immunizations in Kampong Cham Province in 2001, and expanded the usage thereof in other Provinces from November 2002.

In procuring these auto-disable syringes, it becomes necessary to select environmentally-sensitive types.

As part of measures against tuberculosis (hereinafter to be referenced as "TB"), treatment of the disease has been offered free of charge and the drugs were mostly donated by the German government. When German assistance was discontinued in 1997, the Cambodian Ministry of Health took over the procurement of anti-TB drugs and purchased them from one Cambodian company, which led to a sudden rise in national medical expenditures. Even after the forming of the procurement department within the Ministry of Health in 2001, drug price in Cambodia remained as high as three times that of international rate, and poor-quality products continued to circulate in the market. In addition to the problems of inadequate control and possible depletion of drug reserves due to unstable supply, Cambodia has been suffering numerous difficulties associated with the procurement of pharmaceuticals, including shortages caused by the confusion after the introduction of international tender in 2003 and the effects of the general election held in the same year, which necessitated the government to make emergency purchases of pharmaceuticals from GDF[9].

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[7] WHO has set three sequential phases of measles elimination. Phase 1 (control phase): measles incidence is constant with frequent to periodic outbreaks. The goal of this stage is to reduce measles incidence and mortality. Phase 2 (outbreak prevention phase): aims to prevent periodic outbreaks while maintaining low overall incidence. Phase 3 (elimination phase): indigenous transmission of measles virus is virtually eliminated almost to the point of declaring eradication (reported measles incidence, except that caused by imported cases. is 1 or less per 1 million population) .

[8] Auto-disable syringes were developed to prevent the transmitting infectious diseases through inappropriate use of syringes. They become unusable after one injection.

[9] GDF (Global TB Drug Facility): hosted by WHO and managed by the Stop TB secretariat, established in corporation with Rockefeller Foundation, World Bank, and other organizations to assist the procurement of high-quality anti-TB drugs for DOTS

The 2004 national survey reports an annual increase of about 19,000 in the number of smear-positive patients. Since interrupted treatment regimens of these patients could not only increase the risk of new infections but also could spread drug-resistant TB, procuring and ensuring stable supply of high-quality drugs that meet the applicable international standards are among the most pressing issues of the Cambodian government.

As of 2004, DOTS[10] has been introduced to 89% of the Health Centers throughout Cambodia, owning partially to the implementation of JICA's technical cooperation project "National Tuberculosis Control Project" that started in 1999 (See Table 2-1). The cure rate has exceeded the target level of 85%, and the detection rate is on the increase although it has not reached the 70% target.

Table 1-2 Indicators related to DOTS expansion

		1998	1999	2000	2001	2002	2003	2004
DOTS expansion at HC	New	0	9	50	202	126	319	134
	Total	0	9	59	264	387	706	840
	%	0	0.90%	6%	29%	41%	75%	89%
Newly registerd patients number (smear +)		13,865	15,774	14,822	14,361	17,258	18,366	18,978
Case-detection rate (estimated by NTP)		50%	56%	51%	48%	57%	59%	60%
Cure rate		89%	92%	91%	88%	89%	90%	-

Source: CENAT (2003, 2004)

In January 2005, TB treatment regimens were switched to more promising new methods, as the efficacy of the conventional regimens in preventing HIV[11] complication and relapse was limited. Because the new regimens involve the administration of Rifampicin for extended periods of time, improper use of the drug could easily result in the development of drug-resistant TB. Since the quality and the supply conditions of the anti-TB drugs will greatly affect the effectiveness of DOTS, external assistance is needed to ensure the stable supply of high-quality drugs.

Under these circumstances, the Cambodian Ministry of Health submitted an official request to the Government of Japan to extend assistance for the procurement of vaccines, cold-chain equipment, auto-disable syringes that are

[10] Observed Treatment, Short Course): A TB control strategy recommended by WHO. This treatment method tries to prevent the spread of TB infection by having health workers directly observe the swallowing of anti-TB drugs by patients who were detected by sputum smear examination. Strong political commitment by the government, proper storage of patient records, and effective supervision and evaluation of anti-TB activities based on a well established reporting system are all part of a successful DOTS program

[11] Human Immunodeficiency Virus

necessary for the implementation of the National Strategy on Immunization, as well as anti-TB drugs that are needed for controlling TB.

This Project was requested in 2001 and approved to be implemented in three phases. This report concerns the third phase of the Project.

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

In 2002, the Royal Government of Cambodia initiated the Medium-Term Expenditure Framework (MTEF 2003-2007) in order to effectively allocate the national budget and foreign assistance funds among necessary projects in different sectors in a comprehensive manner. For the health sector, MTEF plans to improve health and medical services, develop human resources, and reform the health organizations, aiming at lowering the infant and maternal mortality rates, improving maternal-and-child nutrition, decreasing medical expenditures for the poor, reforming the health system, and achieving other objectives.

This Project is designed in line with the National Strategy on Immunization and the National Health Strategic Plan for TB Control that were developed based on MTEF and aims to improve the effectiveness of Cambodia's immunization activities by procuring necessary vaccines and cold-chain equipment to prevent the deterioration of vaccines, as well as to control tuberculosis by improving the case detection rate and supporting the treatment through the provision of anti-TB drugs. This portion of the Project, which was implemented in FY 2003 and FY2004, will be installed as the third phase of the Project for the purpose of assisting the Cambodian government in meeting the objectives of its national plans to reduce the morbidity rates of preventable diseases through the procurement of certain equipment and supplies necessary for conducting effective immunization activities.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

This Grant Aid Project is to assist the Royal Government of Cambodia in the implementation of the National Strategy on Immunization 5-Year Work Plan 2001-2005 and the National Strategic Plan for Tuberculosis Control 2001–2005 by providing funds to procure vaccines for campaign, syringes for vaccination and safety boxes necessary for properly

discarding used syringes, as well as freezers and refrigerators for storing and preserving vaccines, that are to be distributed to the Provincial Health Districts and Operational Districts, plus vaccine carrying equipment, temperature monitoring equipment, and anti-TB drugs. This Project was designed based on the following policies and guidelines.

1. Basic Policy (target regions and population)

According to the policy of the Cambodian Ministry of Health for the implementation of the National Strategy on Immunization and the National Strategic Plan for TB Control, this Project targets in all parts of Cambodia, such as at the National Immunization Program (hereinafter to be referenced as "NIP") of the Ministry of Health, National Center for TB and Leprosy Control (hereinafter to be referenced as "CENAT"), Provincial Health District, Operational District, National hospitals in Phnom Penh, referral hospitals and Health Centers. OPV will be given in particularly high-risk areas among the regions that are exposed to possible invasion of poliovirus from neighboring countries. Such areas consist of the mountainous region along the Thai border (Banteay Meanchey, Battambang, Oddar Meanchey, and Preah Vihear provinces and Pailin city), the region along the Viet Num border (Kampot, Kandal, Prey Veng, and Ratanakiri provinces), the surrounding areas of the Tonle Sap Lake and Phnom Penh city.

The target population of immunization consists of neonates and children under 5 years of age, and the population size during the implementation period of this phase of the Project in 2006 is estimated based on the 2004 census report published by the Ministry of Planning. The population to be covered by the anti-TB treatment in 2006 is estimated based on the actual number of TB patients and the increase rate in 2004 as recorded and calculated by CENAT.

2. Policy on Natural Environment

The overall climate of Cambodia is tropical monsoon. The average temperature is 27.4°C and could rise to as high as 40°C during the dry season. Therefore, the refrigerators should be able to maintain the inside temperature between +2 and –8°C at 43°C outside temperature, and the freezers should be able to constantly keep the temperature within the –15 to –30°C range. Cold boxes and vaccine carriers to be used outdoors should be encased in containers made of

plastic or other weather-resistant materials. Vaccines, freeze watch indicators[12], refrigerator monitors[13], and cold chain monitor cards (CCM)[14] that are susceptible to temperature changes need to be transported and stored within specified temperature ranges.

3. Policy on Social Conditions

The electric power distribution network in Cambodia is not fully developed, and power outages occur frequently. So electric refrigerators shall be icelined, meaning that the walls are engirdled with frozen tubes to maintain the proper inside temperature during power outage.

4. Policy on Environmental Protection

In order to protect the ozone layer to prevent global warming, CFC-free refrigerators and freezers should be selected.

5. Policy on Operation and Maintenance

Cambodia is in the process of standardizing cold-chain equipment and has established ten standard types (Table 2-1).

[12] Freeze watch indicator is a card that monitors vaccine's exposure to temperature below 0˚C, at which a vial that is filled with temperature-sensitive liquid and built in the card bursts and releases the colored liquid to stain the card. The card cannot be reused after staining.

[13] Refrigerator monitor is a card to monitor whether or not the vaccine is kept within a proper temperature range (2 – 8°C). Each card has a vial of temperature-sensitive liquid, which stains the card when exposed to improper temperatures (below 0˚C or above 10°C or 34°C) for longer than a certain duration time. Each card also has a monitor mark, which changes color when exposed to improper temperatures. The card cannot be reused once the card is stained or the monitor mark changed its color.

[14] Cold chain monitor card (CCM) is an indicator that monitors exposure to improper temperatures (above 10°C and 34°C) throughout the entire journey of vaccine. The indicator shows whether or not the vaccine is usable and under what conditions by changing its color. Once the color has changed, the card cannot be reused.

Table 2-1: List of Standard Cold-Chain Equipment

	Central Medical Stores (CMS)	Provincial Health District	Operational District			Health Center		
			Electrified areas	Unelectrified areas	Transport of vaccine	Electrified areas	Unelectrified areas	Vaccination site
Vaccines to be refrigerated	Cold Room (refrigeration)	Icelined Refrigerator (large)	Icelined Refrigerator (large or small)	Gas/electric refrigerator & freezer (large)	20-litre cold box	Icelined Refrigerator (small)	Gas/electric refrigerator & freezer (small)	1.6-liter vaccine carrier
Vaccines to be frozen	Cold Room (freezer)	Chest Freezer (large or small)	Chest Freezer (small)			Chest freezer (small) (for selected Health Centers only)		
Production of icepacks	Chest Freezer (large)							

Standardization of equipment is favorable to Cambodia where financial and human resources are scarce and maintenance services and spare parts are available only from a limited number of suppliers. Therefore, this Project will select cold-chain equipment that corresponds to the Cambodian standardization.

6. Policy on Model Types and Grades

1) Equipment Related to Vaccination Activities

① Vaccine

WHO has examined and selected certain manufacturers that could produce vaccines to satisfy certain quality requirements in large enough quantities at reasonable prices, and qualified them as suppliers for UNICEF and other UN organizations. This Project will procure vaccines from these manufacturers also.

② Auto-disable Syringe / Safety Box / Cold Chain equipment / Temperature monitoring equipment

These items will be selected from those that meet the standards established by WHO. Such models are designed for use in developing countries. They are highly durable and heat resistant and have other design features to ensure proper storage of vaccines. Other advantages include the availability and longer stock periods of spare parts, as they undergo fewer model changes than other standard models.

③ Disposable Syringe

Since no standards are set by WHO for disposable syringes, this Project will procure the product from manufacturers that have obtained ISO9001 or 9002 certifications to ensure the quality.

2) Anti-TB Drug

The following anti-TB drugs will be procured, as they are currently used in Cambodia (Table 2-2, 2-3).

Table 2-2: Anti-TB Drugs Currently Used in Cambodia (for adults)

Name of Drug	Pharmaceutical form	Abbreviation
Rifampicin 150 mg+ Isoniazid 75 mg	Tablet	RH150/75
Pyrazinamide 400 mg	Tablet	Z400
Ethambutol 400 mg	Tablet	E400
Streptomycin 750 mg	Injection	S750

Table 2-3: Anti-TB Drugs Currently Used in Cambodia (for infants and children)

Name of Drug	Pharmaceutical form	Abbreviation
Rifampicin 60 mg + Isoniazid 30 mg + Pyrazinamide 150 mg	Tablet	RHZ60/30/150
Rifampicin 60 mg + Isoniazid 30 mg	Tablet	RH60/30

As for Anti-TB drugs for adults, drug manufacturers will be chosen from those recommended by GDF to international donor organizations and developing countries as a result of their joint investigation to identify companies that could manufacture drugs to consistently meet a certain quality level and supply them at a relatively low price. For enclosing drug tablets, the Ministry of Health intends to use blister package[15], which allows easier inventory control and higher protection against moisture especially when stored by individual patients. This packaging method will also reduce the risk of mix-ups and dispensing errors by medical workers. To make the observation of drug intake easier, each sheet will contain 1-week doses (=28 tablets).

The dosage form, composition, potency, and other properties of the drugs for children shall conform to those currently effective in Cambodia. Although the WHO/GDF standards are not applicable to these drugs, they will be procured from manufactures of which products have passed the WHO/GDF criteria to ensure the quality of the drugs.

[15] Contains a specific number of tablets on a sheet of blisters, by pushing which the patient can take out a needed number of tablets right before swallowing them. This type of packaging is hygienic, damp-proof, and easy to see the contents

7. Policy on Procurement Method and Timeframe

Anti-TB drugs need to be delivered in strict accordance with the schedule that was formulated during Phase I, as interruption of drug supplies in the midst of treatment regimens could result in the development of drug resistant TB.

2-2-2 Basic Design

1. Equipment Plan

The table below shows the equipment items that are deemed necessary, their descriptions, applications, and quantities (Table 2-4).

Table 2-4: Equipment List

	Item	Description	Phase III Qty. to be procured
1	Measles Vaccine	Dry attenuated vaccine to prevent measles infection.	1,940,000 doses
2	Oral Polio Vaccine	Attenuated live virus Oral polio vaccine (OPV) to prevent polio	810,000 doses
3	Hepatitis B Vaccine	Recombinant DNA Hepatitis B vaccine to prevent neonates from becoming a hepatitis B carrier.	90,000 doses
4	Autodisable Syringe	For measles campaign	1,620,000 pcs.
5	Disposable Syringe	For injecting measles vaccine (freeze dried) dilution	194,000 pcs.
6	Safety Box, Medium	For discarding used syringes in outreach programs.	19,000 pcs.
7	Icelined Refrigerator, Large	For storing vaccines at Provincial Health Districts and Operational Districts (200L class)	50 units
8	Icelined Refrigerator, Small	For storing vaccines at National Hospitals in Phnom Penh (40-50Lclass)	5 units
9	Chest Freezer, Large	For storing vaccines and making icepacks at Provincial Health Districts (320L class)	7 units
10	Cold Box	For transporting vaccines. To be provided for CMS	20 units
11	Vaccine Carrier	For transporting vaccines in outreach activities. To be provided for each Operational District and Health Center.	1,000 units
12	Vaccine Thermometer	For monitoring temperatures of freezers and refrigerators.	500 units
13	Temperature Data Logger	For monitoring temperatures of freezers and refrigerators to properly store vaccines at NIP and Provincial Health Districts (periodic observations and data analysis).	24 units
14	Freeze Watch Indicator	Irreversible temperature indicator to monitor exposure to sub-freezing temperatures when transporting DTP-Hep B, tetanus, and hepatitis-B vaccines.	500 pcs.
15	Refrigerator Monitor	Dual irreversible temperature indicator Monitor mark at +10 - +34°C and Freeze watch	3,000 pcs
16	Cold Chain Monitor Card	Irreversible temperature indicator with monitor mark at +10 – +34℃	2,000 pcs
17	Rifampicin 150 mg+ Isoniazid 75 mg	Anti-tuberculosis drugs for adults recommended by GDF/WHO to be used throughout Cambodia.	59,601 boxes
18	Pyrazinamide 400 mg		19,491 boxes
19	Ethambutol 400 mg		10,758 boxes
20	Streptomycin 750 mg		59,000 units
21	Rifampicin 60 mg + Isoniazid 30 mg + Pyrazinamide 150 mg	Anti-tuberculosis drugs for infants to be used throughout Cambodia.	124,000 tablets
22	Rifampicin 60 mg + Isoniazid 30 mg		248,000 tablets

Quantities and contents of equipment to be procured in Phases II and III were determined at the time of the survey of Phase I and modified in this survey for Phase II in order to better reflect the present conditions. The modifications include the following:

・Continued request for hepatitis-B vaccines, request for additional measles vaccines for campaigns.

・Adjustment to the quantities of syringes and safety boxes to those needed for the measles campaigns.

・Switch to different types of refrigerators due to an increase of electrified areas

・Adjustment to the needed quantities of refrigerators and freezers as a result of donation from other donors or purchase of similar equipment by the Cambodian government.

・Adjustment to the needed quantities of anti-TB drugs according to the estimated number of patients calculated based on the latest data; continued request for anti-TB drugs for children.

・As was the case in Phase II, exclusion of reagents for sputum smear examination due to withdrawal of the request by the Cambodian government.

How we calculated the needed quantity of each equipment item is described later in this document under "2. Rationale for Calculation." We have examined the validity of the Cambodian Health Ministry's request for additional measles vaccines, as well as the continued supply of hepatitis-B vaccines and anti-TB drugs for children. The details of our examination process are described in the following paragraphs.

Request for cold rooms was later withdrawn, as they were deemed unnecessary because the existing cold rooms that had been procured during Phase I would provide enough space for storing vaccines if they were delivered in installments. Request for computers, although their validity was high, was also removed in favor of other items of greater urgency.

1) Measles Vaccine

It is estimated that over 30 million people are infected with measles and about 875,000 die from the disease annually in the world. Deaths caused by measles account for 6.24% of the total deaths from infectious diseases worldwide, and measles is ranked as the number one cause of death among single pathogens. Measles virus spreads from human to

human via aerosol droplets or by contagion. It is highly infectious, and almost 100% of persons who are sensitive to measles are said to develop symptoms of measles. There is no special cure for this disease, but advanced countries reportedly were able to reduce its death rate down to 0.1 to 0.2% through improved nutrition and symptomatic treatment. In Japan, 100,000 to 200,000 measles cases are reported annually, of which about 30% develop pneumonia or other complications at the average hospitalization rate of 40%, indicating the severity of the disease.

On the other hand, smallpox was eradicated from the world, and the Western Pacific Region was declared polio-free in 2000 through vaccination. These two diseases, like measles, are caused by viruses that spread from human to human as their exclusive hosts, indicating that measles could also be eradicated through vaccination.

The Cambodian Ministry of Health, prompted by the mass epidemic in 2000, has carried out supplemental immunization activities (SIAs) in four occasions from December 2000 to May 2005 under the assistance from the Japanese government, WHO, UNICEF, AusAID and other aid organizations (about US$ 3 million in total). The first SIA targeted children under 5 in nine under-populated provinces, the second and the third SIAs gave booster injections to children aged 9 months – 14 years in the more populated 15 provinces (including the special district), and the fourth SIA targeted children aged 7 – 14 years as a catch-up of the first. Figure 3-1 shows the results of these SIAs.

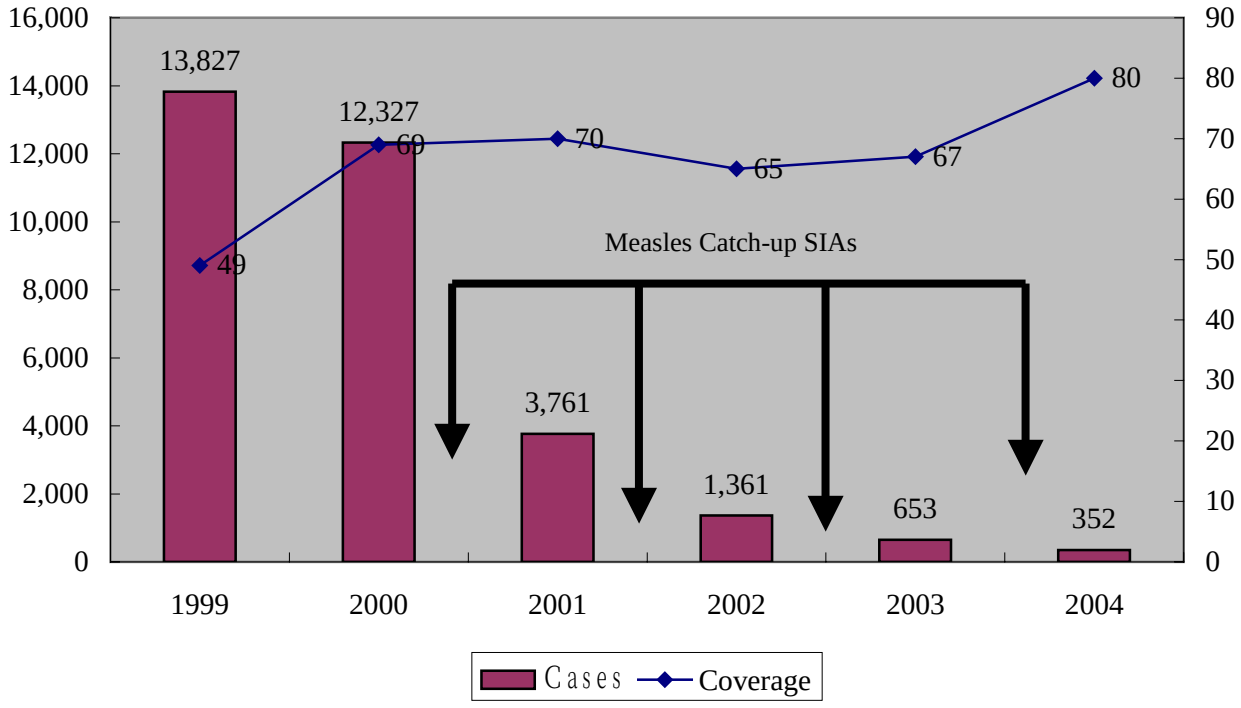

Figure 3-1: Reported Number of Measles Cases and Routine Immunization Coverage (1999-2004)

The measles campaigns were able to immunize five million children, recording the coverage of 80 – 103%, but reportedly still missed about 13,000 children. In addition, the size of susceptible population is expanding, as the number of children who have escaped routine immunization programs accumulates (the coverage of measles vaccination in 2003 was 67%), increasing the risk of mass epidemic, which must be prevented by immediate actions. In July 2004, WHO's Regional Office for the Western Pacific committed itself to the goal of measles elimination from the region by 2012. The Cambodian Ministry of Health indicates that in order to achieve this goal by 2012 while maintaining the current low incidence rate, it is essential to conduct a campaign in the next epidemic cycle in 2006, for which an estimated amount of about US$670,000 is needed. We decided to include measles vaccines in the procurement list of this Project to support the 2006 campaign, as its necessity, validity, and cost effectiveness were all deemed high.

2) Hepatitis B Vaccine

In Cambodia, 8.2% of the blood donors in 1999 were tested HBs antigen positive[16], and today 10 – 12% of the entire nation is said to have persistent infection[17] with hepatitis-B virus. Hepatitis B is largely transmitted by direct contact with the blood or other bodily fluids of an infected person. The main route of infection is through vertical transmission from mother to child. According to Japanese data, about 40 - 50% of children whose mothers are HBs antigen positive become infected, and about 90% of children whose mothers are HBe antigen positive[18] get infection. Horizontal infection within the family is also common. In Taiwan, it is reported that about 25% of the siblings of HBe antigen positive become infected with the virus. People who are infected at young ages become hepatitis-B carriers at a very high percentage. Carriers have a high risk of infecting others, as well as developing chronic hepatitis, liver

[16] Hepatitis B surface (HBs) antigen: A hepatitis-B virus is made up of distinct shell and core layers. HBs antigens exist on the surface of virus particles, which can be detected in a blood sample, and therefore are used as one of the markers of hepatitis. When a person is tested HBs antigen positive, it indicates an active infection with hepatitis B viruses.

[17] Persistent infection is a state where a person remains infected for a prolonged period of time without developing clinical symptoms.

[18] Hepatitis B e (HBe) antigens exist within the HBc antigens in the core layer of a hepatitis-B virus. When a person is tested HBe antigen positive, it indicates that the person is infected with highly-infectious viruses and has a risk of aggravating hepatitis.

cirrhosis, and hepatocellular carcinoma in themselves. Therefore, controlling infection during the neonate to infant stage by vaccination and other measures could work very effectively for preventing liver diseases.

In 1992, WHO recommended that hepatitis B vaccine be integrated into the national immunization programs of all countries by 1997. As of May 2003, 151 (or 79%) of 192 WHO member states have adopted hepatitis B vaccination in the infant stage. According to the immunization data submitted by 137 of these countries, 76 (or 55%) are administering the first hepatitis B shot right after birth.

64 (or 72%) of 89 WHO member states, whose rates of persistent hepatitis-B infection have been traditionally high, are also adopting the infant-stage hepatitis-B vaccination program, and 34 countries (or 53%) are giving vaccination immediately after birth.

In September 2003, the 54th Session of the WHO Regional Committee for the Western Pacific took place in the Philippines, in which eradication of measles and the control of hepatitis-B were established as two core strategies for strengthening EPI (Expanded Programme on Immunization) activities.

The Cambodian government listed the reduction of hepatitis-B infection rate as one of the objectives of the National Immunization 5-Year Plan (2001 - 2005). In 2001, it began introducing DPT-Hep B vaccines to gradually spread the program nationwide, which is to cover 38 (or 50%) in 2004 and 100% of the entire Health Districts in 2005. In parallel to this, the Cambodian Ministry of Health began giving hepatitis B vaccines to babies immediately after birth at the hospitals in Phnom Penh City and the Health Centers in Takeo, Kandal, and Kampong Chhnang Provinces and is making a significant progress in the reduction of hepatitis B infection from 2003, as this kind of vaccination can prevent birth-canal infection quite effectively.

The Ministry of Health plans to disseminate the neonate vaccination throughout the country as part of its routine immunization program. The Ministry of Health's total budget related to vaccines and vaccination activities in 2003 was 5.19 million dollars, of which the Ministry appropriated 1.84 million dollars from its own funds. This would be enough to purchase basic vaccines to be used in routine immunization but would barely cover the cost of additional types of vaccines. Nevertheless, the Cambodian government has been increasing the annual budget of the Ministry of Health every year to enforce EPI activities. Therefore, we have determined that procurement of hepatitis B vaccines through this Grant Aid Project was appropriate in terms of assisting the Cambodian government for the next two years

until it can appropriate sufficient funds for successfully integrating neonate hepatitis B vaccination into its routine immunization program nationwide. For the same reason, hepatitis B vaccines will be included in this phase also.

3) Anti-TB Drugs for Infants

Infant and elderly TB patients are at higher risk of progression, as their immune systems are compromised or not fully developed. As with adults, first infection tends to go unnoticed without symptoms until the TB viruses that were lying dormant in their lungs become active to develop secondary TB as the hosts' body resistance deteriorates with age or other reasons. On the other hands, small children are more susceptible to primary TB (developing TB immediately after first infection), which tends to spread to the entire body through the lymphatic system and blood vessels to cause serious conditions. The younger the patient, the faster the primary infection tends to progress into such grave diseases as miliary TB (= disseminated TB)[19] and tuberculous meningitis[20] that are extremely serious to infants often resulting in death or severe sequela.

Infant TB is mostly caused by infection within the family. According to a study report, the infection and incidence rates of children aged between 0 and 14 who have made contact with smear-positive cases are 39 – 65% and 37.7% respectively.

Japanese technical assistance, National Tuberculosis Control Project in Cambodia, have helped the dissemination of TB treatment among Cambodian people. In the past, there was a tendency among TB patients and their family members to conceal the illness from others. However, as a result of education and guidance under anti-TB projects, more and more people now recognize the importance of early detection and treatment of TB. When parents develop TB, they are more willing to have their children tested for infection, which is raising the detection rate of infant TB.

Phase I of this Project, during which the number of infant patients were not fully identified, attended the situation by giving each infant patient a portion of adult anti-TB drugs made by breaking up tablets. However, this method left a

[19] Miliary TB is a life-threatening condition that occurs when large numbers of TB bacilli get into the blood stream and spread throughout the body. It is defined as millet-like seeding or similar-sized nodules of TB bacilli in at least two organs.

[20] Tuberculous meningitis is caused by hematogenic dissemination of TB bacilli to the meninges or by secondary progress of tuberculous nodules in the brain base to the meninges.

number of problems, such as inaccurate doses and hard-to-swallow tablets for children because of large size and bitterness. Prescription of chewable-type anti-TB drugs for infants would solve these problems, which would lead to improved compliance[21] and more cases of successful completion of treatment regimens.

The detection rate of infant TB has been rising. Consequently, control of infant TB has become one of the priority agendas of JICA's anti-TB projects, under which an emergency budget was appropriated in March 2003 for procuring infant anti-TB drugs for 500 patients, an estimated number of infants who would need treatment in 2004. Although the Cambodian government has decided to procure such drugs on its own account, it will take nearly two years between the time of budget application and the actual delivery of drugs, during which the Cambodian government needs assistance in sustaining its infant TB control program and requested the Japanese government to procure such drugs under this Grant Aid Project. Thus, as was the case with Phase II, this item will also be included in Phase III.

2. Rationale for Calculation

1) Vaccine (Item No. 1, 2, 3)

Measles vaccines will be procured in the quantity needed for conducting the 2006 campaign that will target children aged 9 months – 4 years throughout Cambodia toward achieving the goal of measles elimination by 2012 while preventing mass epidemic by decreasing the accumulated number of unvaccinated children.

OPV will be procured for polio campaigns targeting children under 5 living in the mountainous region along the Thai border (Banteay Meanchey, Battambang, Preah Vihear and Pailin), the region along the Viet Num border (Kampot, Kandal, Prey Veng, and Ratanakiri), the surrounding areas of the Tonle Sap Lake that include slum districts, and particularly high-risk Operational Districts within Phnom Penh.

Hepatitis-B vaccines will be procured to cover the entire country to immunize newborns immediately (within 7 days) after birth.

The needed quantity of each vaccine was calculated based on the projected size of each target population in 2006 in

[21] Compliance means that a patient takes prescribed medicines exactly as instructed by the physician.

the formulas shown below, which took into account deactivation of vaccines[22] due to inadequate cold-chain equipment, as well as other wastage caused by breakage or loss during transportation and discarding of unused vaccines. In addition, as for hepatitis B vaccines, a certain percentage of reserve stock was included in case of population influx into the target regions from neighboring areas, and other contingencies.

Needed doses of vaccine = (target population × coverage × no. of doses × wastage coefficient) + reserve stock

Variables used in the calculation were as follows:

① Target population

Measles (for children aged 9 months – 4 years throughout Cambodia): 1,457,235 persons

OPV (for children under 5 in selected areas): 303,567 persons

Hepatitis B (for neonates within 7 days after birth throughout Cambodia): 376,467 persons

The size of each target population was calculated based on the estimated population in 2006 by age group and region announced by the Ministry of Planning in 2004.

② Coverage

The target coverage rates that the Ministry of Health established for the 2006 measles campaign and for birth dose of Hepatitis B are as follows:

Measles: 100%, OPV: 100%, Hepatitis B: 40%

③ No. of doses

The number of doses required for each target individual by vaccine type is as follows:

Measles: 1, OPV: 2, Hepatitis B: 1

④ Wastage coefficient

Wastage is a ratio of vaccine that was opened but not used within the same day and therefore needs to be discarded, to the total volume procured. Although the Ministry of Health has established a wastage rate for each type of

[22] Deactivation in this case means a loss of potency of vaccines.

vaccine[23], the actual wastage rates are on the decrease owing to the procurement of transportation vehicles and cold-chain equipment under Phase I, as well as the improvement of campaign strategies and methods. The wastage coefficient is obtained using the formula below:

$$\text{Wastage Coefficient} = \frac{100}{(100 - \text{Wastage})}$$

Wastage = Measles (for campaign): 25%, OPV (for campaign): 25%, Hepatitis B: 10%

⑤ Reserve stock

Reserve stock is kept in case of interrupted supply. In developing countries, reserve stock rates are set somewhere between 20 and 30% while Cambodia sets it at 25%. Since Phase III will procure OPV and measles vaccines for campaign activities, it will not take into account the reserve stock rates for these vaccines. The reserve stock rate for hepatitis B vaccine is calculated as follows:

Reserve stock = (target population × coverage × no. of doses × wastage coefficient) × reserve stock rate (25%)

As shown in Table 3-5, Phase II procured 580,000 doses of hepatitis B vaccine to cover 50% of the target population (for birth dose in 2005). However, since the coverage of this vaccine remained as low as 10% in 2004, the target coverage for 2005 was later modified from 50% to 30%. The low coverage resulted from a couple of factors. One was the delay in the introduction of hepatitis B birth dose due to deferred delivery of DTP-Hepatitis B vaccines that were to be introduced around the same time. Another reason was that only 11% of actual child deliveries took place in health/medical facilities (only 38% of expectant mothers gave births in the presence of a doctor or midwife according to the 2003 statistics).

Under these circumstances, 20% of the vaccines (91,950 doses) procured for 2005 will be carried forward to 2006. Thus, the quantity of hepatitis B vaccine to procure in Phase III is calculated by subtracting the excess of Phase II from

[23] The Cambodian Ministry of Health, concerned with the high wastage rates, has been making efforts to reduce them. In February 2003, it formulated the Open Vial Policy, which allowed the use of vaccines in open vials for up to 4 weeks after unsealing at Health Centers that are equipped with refrigerators and satisfy certain other conditions. As more Health Centers will be installed with refrigerators, the wastage rates will likely continue to decline.

the needed quantity for 2006 (150,587 doses) and multiplying the difference by the wastage and reserve stock rates.

Based on the above, the quantity of vaccines is calculated and adjusted by rounding up the figures to units of 10,000 as shown in the table below (Table 2-5).

Table 2-5: Needed Quantities of Vaccines

<Measles / OPV>

	Vaccine	Target population A	Coverage B%	Dose C	Needed doses D=AxBxC	Wastage E	Wastage coeeficient F	Qty. taking into account (F) G=DxF	Reserve stock rate H	Reserve stock I=GxH	Total J=G+I	Adjusted to unit of 10,000
FY 2006 (Phase III)	Measles	1,457,235	100%	1	1,457,235	25%	1.33	1,938,123	0%	0	1,938,123	1,940,000
	OPV	303,567	100%	2	607,134	25%	1.33	807,489	0%	0	807,489	810,000

<Hepatitis B>

	Vaccine	Target population A	Coverage B%	Dose C	Needed doses D=AxBxC	Wastage E	Wastage coeeficient F	Qty. taking into account (F) G=DxF	Reserve stock rate H	Reserve stock I=GxH	Total J=G+I	Adjusted to unit of 10,000
FY 2005 (procured)	Hepatitis B	459,748	50%	1	229,874	50%	2	459,748	25%	114,937	574,685	580,000
FY2005 (target)		459,748	30%	1	137,924	50%	2	275,848	25%	68,962	344,810	350,000
FY2005 (carrying-over)		459,748	20%	1	91,950	50%	2	183,900	25%	45,975	229,875	230,000

	Vaccine	Target population A	Coverage B%	Dose C	Needed doses D=AxBxC	Wastage E	Wastage coeeficient F	Qty. taking into account (F) G=DxF	Reserve stock rate H	Reserve stock I=GxH	Total J=G+I	Adjusted to unit of 10,000
FY 2006 (planned)	Hepatitis B	376,467	40%	1	150,587	10%	1.11	167,152	25%	41,788	208,940	201,000
FY2005 (carrying-over)					91,950							
FY2006 (to be procured)					58,637	10%	1.11	65,088	25%	16,272	81,360	90,000

2) Auto-Disable Syringe (Item No. 4)

Size of the auto-disable syringe will be 0.5 ml to hold one dose for one person. This Project will procure auto-disable syringes in the quantity necessary for conducting the measles campaign. Auto-disable syringes for hepatitis B vaccine and other types of vaccines, for which such syringes were procured in Phases I and II for the purpose of ensuring injection safety, will not be included in Phase III to make adjustments with the current inventory.

OPV will not require syringes as it is orally administered using a special dispenser.

. Wastage coefficient was included in the calculation by taking into account the breakage and loss during transportation and by misuse during the vaccination activity. A certain amount of reserve stock was also added, as was the case with vaccines:

Qty. to procure = (target population × coverage × no. of doses × wastage coefficient) + reserve stock

Variables used in the calculation were as follows:

① Target population

1,457,235 persons (same as the target population of measles campaign)

② Coverage

100% (target rate set by the Ministry of Health for the 2006 measles campaign)

③ No. of doses

:1

④ Wastage coefficient

Wastage is a ratio of broken or misused syringes that need to be discarded to the total number of syringes procured. We used 10% wastage as calculated by WHO:

$$\text{Wastage coefficient} = \frac{100}{(100 - \text{Wastage})}$$

⑤ Reserve stock

Reserve stock is kept in case of interrupted supply. Although the reserve stock rate is set at 25% in Cambodia, it will not be taken into account for Phase III, as a sufficient amount still remains in stock.

Based on the above, the quantity of auto-disable syringes is calculated as follows (Table 2-6):

Table 2-6: Needed Quantity of Auto-Disable Syringes

	Application	Target population A	Coverage B%	Dose C	Needed doses D=A x B x C	Wastage E	Wastage coefficient F	Qty. taking into account (F) G=DxF	Reserve stock rate H	Reserve stock I=GxH	Total G+I	Adjusted to units of 10,000
FY 2006 (Phase III)	Measles campaign	1,457,235	100%	1	1,457,235	10%	1.11	1,617,531	0%	0	1,617,53	1,620,000

3) Disposable Syringe (Item No. 6)

Measles vaccine is freeze-dried and needs to be diluted with 'water for injection' at the time of vaccination. As one vial of measles vaccine will require 5ml of solution, the needed quantity of 5ml disposable syringes per vial (10 doses) is calculated as follows:

Qty. to procure = qty. of measles vaccine in doses ÷ 10

4) Safety Box (Item No. 6)

In Phases I and II, safety boxes were procured in the quantities necessary for storing all syringes used for immunization activities for a period of one year. For the purpose of adjusting inventory, Phase III will procure safety boxes for storing only auto-disable syringes and disposable syringes that will be used for the measles campaign. The safety box shall be of a 5-liter type (for storing 100 syringes) that is easy to carry around during the outreach activities. The required quantity of safety boxes is calculated as follows:

Needed qty. = no. of syringes ÷100

The quantity of safety box to be procured in Phase III is shown in Table 3-7 below.

Table 3-7: Needed Quantity of Safety Box

FY	Auto-disable syringe	Disposable syringe	Needle	Needed qty. of safety box	Adjusted to the units of 10,000
2006 (Phase III)	1,620,000	194,000	1,814,000	18,140	19,000

5) Cold-Chain Equipment

・Icelined Refrigerator (Item No. 7 & 8)

One to two large refrigerators will be provided for each of the 12 Provincial Health Districts (total of 17) in electrified areas, and one for each of 33 Operational District, including 18 offices in newly electrified areas. Small refrigerators will be installed in five national hospitals in Phnom Penh for storing hepatitis B vaccines for birth dose

and BCG vaccines.

・Chest Freezer (Item No. 9)

Large chest freezers will be procured to provide one unit for each of seven Provincial Health Districts in Kadal, Takeo, etc. as well as the capital city Phnom Penh, where population is concentrated. Small chest freezers will not be procured in Phase III, although 19 units were planned to be procured at the time of the Phase I survey, because the required quantity was satisfied by the procurement by UNICEF and Phase II.

・Cold Box (Item No. 10)

CMS is using cold boxes for delivering vaccines to Provincial Health Districts and Operating Districts. However, the existing cold boxes were introduced more than five years ago and are now loosing cooling capacities and need to be renewed. Currently, four trucks are used for nation-wide distribution of vaccines, each carrying five cold boxes to make deliveries to two to three Provinces at a time. Since it is easier to retain the inside temperature of the cold box in an appropriate range (0 – 8 ˚C) if the box is opened less frequently, use of five boxes in each truck is deemed appropriate. Thus, Phase III will also procure a total of 20 cold boxes.

・Vaccine Carrier (Item No. 11)

Each Operational District and Health Center needs at least one vaccine carrier for on-site vaccination and at least another one for outreach programs. Since vaccine carriers tend to wear out quickly in Cambodia due to frequent use, WHO recommends that the Cambodian government to replace vaccine carriers every two years to maintain sufficient cooling capacities. In consideration of the above, Phase III will procure 1,000 carriers to provide one unit for each of the 1,090 facilities minus 90, which the Cambodian Ministry of Health can obtain using its own budget.

・Vaccine Thermometer (Item No. 12)

Vaccine thermometers are used in all freezers and refrigerators to monitor temperatures. According to the plan, a total of 1,473 refrigerators and freezers (including 702 refrigerators and 52 freezers procured by this Project) will

start operating throughout Cambodia at the completion of Phase III. Although 1,500 thermometers were already procured by Phases I and II to satisfy this requirement, some units were later found broken during the survey. Vaccine Thermometer is indispensable for vaccine storage. Therefore, Phase III will procure additional 500 units to be stored at the central facility so that they can be used to replace broken ones as needed.

· Temperature Data Logger (Item No. 13)

Phase III will procure a total of 24 data loggers to provide 10 unites for NIP to monitor cold-chain equipment at CMS and during transportation and 14 units for densely populated Provinces to monitor the temperatures of their refrigerators.

· Freeze Watch Indicator (Item No. 14)

Freeze Watch indicator is inserted in each vaccine package when transporting certain types of vaccines (DTP-Hep B, tetanus, and hepatitis B) that are susceptible to subfreezing temperatures. These vaccines are transported from the central storehouse to each of 24 Provinces four times a year, and each transportation uses an average of five indicators. Phase III will procure 500 indicators by rounding up the needed quantity to the nearest packing unit.

· Refrigerator Monitor (Item No. 15)

Refrigerator monitor cards are needed to control the temperatures of refrigerators used in all parts of Cambodia. As these cards cannot be reused once a sign indicating exposure to abnormal temperatures appears on the card, each refrigerator will need two cards annually. There will be 1,473 refrigerators operating nationwide upon the completion of Phase III. Therefore, Phase III will procure 3,000 monitor cards by rounding up the needed quantity to the nearest packing unit.

· Cold Chain Monitor Card (Item No. 16)

CCM cards are used to monitor the temperatures of vaccines during transportation. Vaccines are transported from the central to 24 Provincial storehouses four times per year, each using an average of 10 cards. Transportation from Province to 76 Operational Districts takes place once a month, each using one card. Based on the foregoing, Phase III will procure 2,000 cards by rounding up the needed quantity to the nearest packing unit.

6) Anti-TB Drugs (Item No. 17, 18, 19, 20, 21 & 22)

①Target population

We divided adult TB patients into three categories according to the type of treatment (Table 2-9) and estimated the number of patients in 2006 for each category (Table 2-10) based on the actual number of patients in 2004. Diagnosis and treatment of infant TB are performed mainly at the National Center for Tuberculosis and Leprosy Control, the National Children's Hospital, and Angkor Hospital, based on whose records the number of patients in 2006 was estimated to determine the required drug quantity. We also included additional patients on the average of 20 for each of 40 referral hospitals that will begin accepting infant TB cases in 2006 (Table 2-11).

Table 2-9: Classification of Adult TB Patients

Classification	Type of Patient
Category I:	- new smear positive - smear-negative, pulmonary TB, severe form - about 20% of total smear-negative cases - extra-pulmonary TB, severe form - about 20% of total extra-pulmonary cases
Category II:	- relapse cases - failure cases - return after default cases
Category III:	- smear-negative pulmonary TB, non severe form - about 80% of total smear-negative cases - extra-pulmonary TB, non-severe form ・・・about 80% of total extra-pulmonary cases

Table 2-10: Estimated Number of Adult TB Patients by Category

Year	**New smear positive** (A)	**Retreatment** (B)	**Smear-negative** (C)	**Extra-pulmonary** (D)	**Category I** (A)+(C)×20% +(D)×20%	**Category II** (B)	**Category III** (C)×80% +(D)×80%
2004	18,978	912	5,800	5,415	21,221	912	8,972
2005	20,306	985	7,540	6,227	23,060	985	11,014
2006	21,728	1,064	9,802	7,161	**25,121**	**1,064**	**13,571**
Anuual increase	7%	8%	30%	15%			

Table 2-11: Estimated Number of Infant TB Patients

Year	CENAT	Referral hospitals	National Pediatric Hospital	Angkor Children Hospital	**Total**
2004	60	-	130	220	410
2005	60	400	163	205	828
2006	66	800	179	226	**1,271**
		(20 patients ×40 Referral hospitals)	(Annual increase: 10%)	(Annual increase: 10%)	

②Treatment regimen

Treatment regimen is comprised of the initial phase and the continuation phase. During the initial phase, drugs are given to make the patients smear negative and alleviate clinical symptoms, whereas the treatment regimen for the continuation phase is designed to eradicate residual bacilli for the prevention of relapse. Descriptions of treatment regimen are expressed by placing the number of months indicating the duration of treatment in front of the acronym for each drug or drug combination.

> Example: 2RHZE/6EH (in case of Category I-1-a, Old treatment regimen)
>
> In the initial phase of two months, Rifampicin+Isoniazid (RH), Pyrazinamide (Z), and Ethambutol (E) are administered daily, followed by the six-month continuation phase, during which Ethambutol+Isoniazid (EH) is given every day.

Cambodia has been using four kinds of 8-month regimens to treat TB patients in all three categories, but switched to new 6-months regimens (see Table 2-12) in January 2005 that are characterized as follows:

- Change in the combination of drugs for the continuation phase from Ethambutol+Isoniazid to Rifampicin+Isoniazid.
- Shortening of the duration of each treatment course from eight months to six months (except for Category I-b, for which the duration is seven months)

The above changes are expected to improve compliance and reduce relapses.

Table 2-12: Treatment Regimen

	Old treatment regimen (8-month regimen) until December 2004	New treatment regimen (6-month regimen) from January 2005
Category Ⅰ - a - b[24]	2RHZE/6EH or 3RHZE/5EH	2RHZE/**4RH** or 3RHZE/**4RH**
Category II	2RHZES/1RHZE/5RHE	2RHZES/1RHZE/5RHE (no change)
Category III	2RHZ/6EH	2RHZ/**4RH**

Based on the above, the needed quantity of each drug in Phase III is estimated in the following procedure:

(a) Calculate the quantity of each drug to be consumed by each patient under the new and old treatment regiments

[24] 10% of treated patients do not turn sputum smear negative after two months of treatment in initial phase. For such patients, additional 1-month treatment is given.

(Table 2-13).

(b) Estimate the total consumption of each drug in 2006 based on the size of the target population as determined under Section ① and the quantities of drugs as derived under Paragraph (a) above. Then calculate the projected monthly consumption by dividing the yearly consumption volume by 12 (Table 2-14).

(c) 9-month reserve stock[25] of anti-TB drugs for adults will be included. No reserve stock of anti-TB drugs for infants will be included in Phase III, as they expire in a relatively short period of two years. The needed quantities of anti-TB drugs for adults and infants for Phase III are calculated based on the projected monthly consumptions as derived under paragraph (b) above, as well as taking into account the current stock volumes so that the stocks of anti-TB drugs for adults and infants will be consumed in 21 months and 12 months respectively after their arrival in Cambodia (see Table 2-15).

(d) The quantity of each drug was adjusted by rounding up the estimated figure to the nearest packing unit (Table 2-16).

Since streptomycin is produced in powder form, diluent (water for injection) to dissolve the powder right before injection needs to be procured along with the drug. Syringes necessary for diluting powdered drugs are available in Cambodia and therefore not included in the Project.

Table 2-13: Consumption of Drugs per Patient by Category

[25] To cope with an unexpected increase of patients, CMS has established a policy to keep a 1-year reserve stock of anti-TB drugs for adults, whereas the International Union against Tuberculosis and Lung Disease (IUATLD) recommends to keep a 6-month stock. Phase III will include 9-month reserve stock as requested by CENAT as minimum requirement after considering the fact that the shortage of anti-TB drugs caused by the delayed execution of the government budget for two years became a big issue during the general election in 2003 and would likely become so again in the next general election in 2008 following the completion of this Project, and also by taking into account that this equipment would be the key item to promote the anti-TB projects implemented by the Japanese government.

Old treatment regimen (8M regimen)	Category I				Category II		Category III	
	I-a (90%)		Ⅰ-b (10%)		2RHZES/1RHZE/5RHE		2RHZ/6EH	
	2RHZE/6EH		3RHZE/5EH					
RH 150/100	3 tabs×2M＝	180 tabs	3 tabs×3M＝	270 tabs	3 tabs×8M＝	720 tabs	3 tabs×2M＝	180 tabs
Z 500	2 tabs×2M＝	120 tabs	2 tabs×3M＝	180 tabs	2 tabs×3M＝	180 tabs	2 tabs×2M＝	120 tabs
E 400	2 tabs×2M＝	120 tabs	2 tabs×3M＝	180 tabs	2 tabs×8M＝	480 tabs	－	
EH 400/150	2 tabs×6M＝	360 tabs	2 tabs×5M＝	300 tabs	－		2 tabs×6M＝	360 tabs
S1000	－		－		1 vial×2M＝	60 vials	－	

New treatment regimen (6M regimen)	Category I				Category II		Category III	
	I-a (90%)		Ⅰ-b (10%)		2RHZES/1RHZE/5RHE		2RHZ/4RH	
	2RHZE/4RH		3RHZE/4RH					
RH 150/75	3 tabs×6M＝	540 tabs	3 tabs×7M＝	630 tabs	3 tabs×8M＝	720 tabs	3 tab×6M＝	540 tabs
Z 400	3 tabs×2M＝	180 tabs	3 tabs×3M＝	270 tabs	3 tabs×3M＝	270 tabs	3 tab×2M＝	180 tabs
E 400	2 tabs×2M＝	120 tabs	2 tabs×3M＝	180 tabs	2 tabs×8M＝	480 tabs	－	
S 750	－		－		1 vial×2M＝	60 vials	－	

	Children	
RHZ 60/30/150	3 tabs×2M＝	180 tabs
RH 60/30	3 tabs×4M	360 tabs

Table 2-14: Estimated Monthly/Annual Consumption of Each Drug (2005-2008)

		2005		2006		2007		2008	
RH 150/75	Category I-a	(180 tabs ×23,060 patients ×1/3＋540 tabs ×23,060 patients ×2/3) ×90%＝	8,716,680 tabs	540 tabs ×25,121 patients ×90%＝	12,208,806 tabs	540 tabs ×27,444 patients ×90%＝	13,337,784 tabs	540 tabs×30,084 patients ×90%＝	14,620,824 tabs
	I-b	(270 tabs ×23,060 patients ×1/3＋630 tabs ×23,060 patients ×2/3) ×10%＝	1,176,060 tabs	630 tabs ×25,121 patients ×10%＝	1,582,623 tabs	630 tabs×27,444 patients ×10%＝	1,728,972 tabs	630 tabs ×30,084 patients ×10%＝	1,895,292 tabs
	Category II	720 tabs ×985 patients ＝	709,200 tabs	720 tabs ×1,064 patients ＝	766,080 tabs	720 tabs×1,149 patients ＝	827,280 tabs	720 tabs ×1,241 patients ＝	893,520 tabs
	Category III	180 tabs ×11,014 patients ×1/3＋540 tabs ×11,014 patients ×2/3＝	4,625,880 tabs	540 tabs ×13,571 patients ＝	7,328,340 tabs	540 tabs ×16,783 patients ＝	9,062,820 tabs	540 tabs ×20,829 patients ＝	11,247,660 tabs
Total			**15,227,820 tabs**		**21,885,849 tabs**		**24,956,856 tabs**		**28,657,296 tabs**
Monthly consumption			**1,268,985 tabs**		**1,823,821 tabs**		**2,079,738 tabs**		**2,388,108 tabs**
Z 400	Category I-a	(120 tabs ×1.25×23,060 patients ×1/3＋180 tabs ×23,060 patients ×2/3) ×90%＝	3,528,180 tabs	180 tabs ×25,121 patients ×90%＝	4,069,602 tabs	180 tabs ×27,444 patients ×90%＝	4,445,928 tabs	180 tabs ×30,084 patients×90%＝	4,873,608 tabs
	I-b	(180 tabs ×1.25×23,060 patients ×1/3＋270 tab s×23,060 patients ×2/3) ×10%＝	588,030 tabs	270 tabs ×25,121 patients ×10%＝	678,267 tabs	270 tabs ×27,444 patients ×10%＝	740,988 tabs	270 tabs ×30,084 patients ×10%＝	812,268 tabs
	Category II	180 tabs ×1.25×985 patients ×1/3＋270 tabs ×985 patients ×2/3＝	251,175 tabs	270 tabs ×1,064 patients ＝	287,280 tabs	270 tabs ×1,149 patients ＝	310,230 tabs	270 tabs ×1,241 patients ＝	335,070 tabs
	Category III	120 tabs ×1.25×11,014 patients ×1/3＋180 tabs ×11,014 patients ×2/3＝	1,872,380 tabs	180 tabs ×13,571 patients ＝	2,442,780 tabs	180 tabs×16,783 patients ＝	3,020,940 tabs	180 tabs ×20,829 patients ＝	3,749,220 tabs
Total			**6,239,765 tabs**		**7,477,929 tabs**		**8,518,086 tabs**		**9,770,166 tabs**
Monthly consumption			**519,980 tabs**		**623,161 tabs**		**709,841 tabs**		**814,181 tabs**
E 400	Category I-a	120 tabs ×23,060 patients ×90%＝	2,490,480 tabs	120 tabs ×25,121 patients ×90%＝	2,713,068 tabs	120 tabs ×27,444 patients ×90%＝	2,963,952 tabs	120 tabs ×30,084 patients ×90%＝	3,249,072 tabs
	I-b	180 tabs ×23,060 patients ×10%＝	415,080 tabs	180 tabs ×25,121 patients ×10%＝	452,178 tabs	180 tabs ×27,444 patients ×10%＝	493,992 tabs	180 tabs ×30,084 patients ×10%＝	541,512 tabs
	Category II	480 tabs ×985 patients ＝	472,800 tabs	480 tabs ×1,064 patients ＝	510,720 tabs	480 tabs ×1,149 patients ＝	551,520 tabs	480 tabs ×1,241 patients＝	595,680 tabs
Total			**3,378,360 tabs**		**3,675,966 tabs**		**4,009,464 tabs**		**4,386,264 tabs**
S 750	Category II	60 vials ×985 patients ＝	**59,100 vials**	60 vials ×1,064 patients ＝	**63,840 vials**	60 vials ×1,149 patients ＝	**68,940 vials**	60 vials ×1,241 patients＝	**74,460 vials**
Monthly consumption			**4,925 vials**		**5,320 vials**		**5,745 vials**		**6,205 vials**
RHZ 60/30/150		180 tabs ×828 patients ＝	**149,040 tabs**	180 tabs ×1,271 patients ＝	**228,780 tabs**	180 tabs ×1,718 patients ＝	**309,240 tabs**	180 tabs ×1,970 patients ＝	**354,600 tabs**
Monthly consumption			**12,420 tabs**		**19,065 tabs**		**25,770 tabs**		**29,550 tabs**
RH 60/30		360 tabs ×828 patients ＝	**298,080 tabs**	360 tabs ×1,271 patients ＝	**457,560 tabs**	360 tabs ×1,718 patients ＝	**618,480 tabs**	360 tabs×1,970 patients＝	**709,200 tabs**
Monthly consumption			**24,840 tabs**		**38,130 tabs**		**51,540 tabs**		**59,100 tabs**

Note: The old treatment guidelines instructed the use of RH150/100, Z500, and S1000, which were replaced by RH150/75, Z400, and S750 by the new policy. In estimating the monthly and annual consumption of each drug in 2005, CENAT converted the quantity of each drug to be used under old regimen into the amount used under new regimen by replacing RH150/100 (old) and S1000 (old) with RH150/75 (new) and S750 (new) and applying the "Z500 = Z400 x 1.25) equivalent formula in the calculation of Z (pyrazinamide).

Although new treatment regimens will start in January 2005, patients who were registered during 2004 will continue with their old treatment. This means that patients undergoing old regimens will remain until the end of August 2005, while the number of patients undergoing new treatment will gradually increase after January 2005 until September 2005 when all patients will be treated under the new prescriptions. For the purpose of convenience, we have set the ratio of old to new treatment patients at one to two as shown in the figure below. Based on this ratio, we estimated the annual consumption of drugs under the old regimen by multiplying the total consumption by 1/3 and the annual consumption under the new regimen by multiplying the total by 2/3.

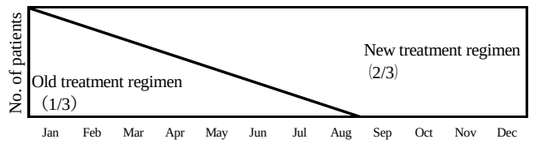

Table 2-15: Needed Drug Quantity

		Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05
								Japan's Grant Aid II					
RH150/75	Receipt							18,700,416					
	Consumption	840,500	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985	1,268,985
	Balance	11,602,229	10,333,244	9,064,259	7,795,274	6,526,289	5,257,304	22,688,735	21,419,750	20,150,765	18,881,780	17,612,795	16,343,810
Z400	Receipt							4,157,664					
	Consumption	917,952	519,980	519,980	519,980	519,980	519,980	519,980	519,980	519,980	519,980	519,980	519,980
	Balance	7,717,020	7,197,040	6,677,060	6,157,080	5,637,100	5,117,120	8,754,804	8,234,824	7,714,844	7,194,864	6,674,884	6,154,904
E400	Receipt							2,560,320					
	Consumption	782,808	281,530	281,530	281,530	281,530	281,530	281,530	281,530	281,530	281,530	281,530	281,530
	Balance	1,455,104	1,173,574	892,044	610,514	328,984	47,454	2,326,244	2,044,714	1,763,184	1,481,654	1,200,124	918,594
S750	入庫数							103,000					
	出庫数	9,900	4,925	4,925	4,925	4,925	4,925	4,925	4,925	4,925	4,925	4,925	4,925
	在庫数	50,560	45,635	40,710	35,785	30,860	25,935	124,010	119,085	114,160	109,235	104,310	99,385
RHZ 60/30/150	入庫数							345,000					
	出庫数	12,420	12,420	12,420	12,420	12,420	12,420	12,420	12,420	12,420	12,420	12,420	12,420
	在庫数	77,580	65,160	52,740	40,320	27,900	15,480	348,060	335,640	323,220	310,800	298,380	285,960
RH 60/30	入庫数							689,000					
	出庫数	24,840	24,840	24,840	24,840	24,840	24,840	24,840	24,840	24,840	24,840	24,840	24,840
	在庫数	155,160	130,320	105,480	80,640	55,800	30,960	695,120	670,280	645,440	620,600	595,760	570,920
		Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
								Japan's Grant Aid III					
								21M	20M	19M	18M	17M	16M
								12M	11M	10M	9M	8M	7M
RH150/75	Receipt							40,051,330					
	Consumption	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821	1,823,821
	Balance	14,519,989	12,696,168	10,872,347	9,048,526	7,224,705	5,400,884	43,628,393	41,804,572	39,980,751	38,156,930	36,333,109	34,509,288
Z400	Receipt							13,097,844					
	Consumption	623,161	623,161	623,161	623,161	623,161	623,161	623,161	623,161	623,161	623,161	623,161	623,161
	Balance	5,531,743	4,908,582	4,285,421	3,662,260	3,039,099	2,415,938	14,890,621	14,267,460	13,644,299	13,021,138	12,397,977	11,774,816
E400	Receipt						1000000	7,228,930					
	Consumption	306,331	306,331	306,331	306,331	306,331	306,331	306,331	306,331	306,331	306,331	306,331	306,331
	Balance	612,263	305,932	-399	-306,730	-613,061	80,608	7,003,207	6,696,876	6,390,545	6,084,214	5,777,883	5,471,552
S750	Receipt							58,215					
	Consumption	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320
	Balance	94,065	88,745	83,425	78,105	72,785	67,465	120,360	115,040	109,720	104,400	99,080	93,760
RHZ 60/30/150	Receipt							123,210					
	Consumption	19,065	19,065	19,065	19,065	19,065	19,065	19,065	19,065	19,065	19,065	19,065	19,065
	Balance	266,895	247,830	228,765	209,700	190,635	171,570	275,715	256,650	237,585	218,520	199,455	180,390
RH 60/30	Receipt							247,420					
	Consumption	38,130	38,130	38,130	38,130	38,130	38,130	38,130	38,130	38,130	38,130	38,130	38,130
	Balance	532,790	494,660	456,530	418,400	380,270	342,140	551,430	513,300	475,170	437,040	398,910	360,780
		Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
		15M	14M	13M	12M	11M	10M	9M	8M	7M	6M	5M	4M
		6M	5M	4M	3M	2M	1M	0M					
RH150/75	Receipt												
	Consumption	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738	2,079,738
	Balance	32,429,550	30,349,812	28,270,074	26,190,336	24,110,598	22,030,860	19,951,122	17,871,384	15,791,646	13,711,908	11,632,170	9,552,432
Z400	Receipt												
	Consumption	709,841	709,841	709,841	709,841	709,841	709,841	709,841	709,841	709,841	709,841	709,841	709,841
	Balance	11,064,975	10,355,134	9,645,293	8,935,452	8,225,611	7,515,770	6,805,929	6,096,088	5,386,247	4,676,406	3,966,565	3,256,724
E400	Receipt												
	Consumption	334,122	334,122	334,122	334,122	334,122	334,122	334,122	334,122	334,122	334,122	334,122	334,122
	Balance	5,137,430	4,803,308	4,469,186	4,135,064	3,800,942	3,466,820	3,132,698	2,798,576	2,464,454	2,130,332	1,796,210	1,462,088
S750	Receipt												
	Consumption	5,745	5,745	5,745	5,745	5,745	5,745	5,745	5,745	5,745	5,745	5,745	5,745
	Balance	88,015	82,270	76,525	70,780	65,035	59,290	53,545	47,800	42,055	36,310	30,565	24,820
RHZ 60/30/150	Receipt												
	Consumption	25,770	25,770	25,770	25,770	25,770	25,770	25,770	25,770	25,770	25,770	25,770	25,770
	Balance	154,620	128,850	103,080	77,310	51,540	25,770	0	-25,770	-51,540	-77,310	-103,080	-128,850
RH 60/30	Receipt												
	Consumption	51,540	51,540	51,540	51,540	51,540	51,540	51,540	51,540	51,540	51,540	51,540	51,540
	Balance	309,240	257,700	206,160	154,620	103,080	51,540	0	-51,540	-103,080	-154,620	-206,160	-257,700
		Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08
		3M	2M	1M	0M								
RH150/75	Receipt												
	Consumption	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108	2,388,108
	Balance	7,164,324	4,776,216	2,388,108	0	-2,388,108	-4,776,216	-7,164,324	-9,552,432	-11,940,540	-14,328,648	-16,716,756	-19,104,864
Z400	Receipt												
	Consumption	814,181	814,181	814,181	814,181	814,181	814,181	814,181	814,181	814,181	814,181	814,181	814,181
	Balance	2,442,543	1,628,362	814,181	0	-814,181	-1,628,362	-2,442,543	-3,256,724	-4,070,905	-4,885,086	-5,699,267	-6,513,448
E400	Receipt												
	Consumption	365,522	365,522	365,522	365,522	365,522	365,522	365,522	365,522	365,522	365,522	365,522	365,522
	Balance	1,096,566	731,044	365,522	0	-365,522	-731,044	-1,096,566	-1,462,088	-1,827,610	-2,193,132	-2,558,654	-2,924,176
S750	Receipt												
	Consumption	6,205	6,205	6,205	6,205	6,205	6,205	6,205	6,205	6,205	6,205	6,205	6,205
	Balance	18,615	12,410	6,205	0	-6,205	-12,410	-18,615	-24,820	-31,025	-37,230	-43,435	-49,640
RHZ 60/30/150	Receipt												
	Consumption	29,550	29,550	29,550	29,550	29,550	29,550	29,550	29,550	29,550	29,550	29,550	29,550
	Balance	-158,400	-187,950	-217,500	-247,050	-276,600	-306,150	-335,700	-365,250	-394,800	-424,350	-453,900	-483,450
RH 60/30	Receipt												
	Consumption	59,100	59,100	59,100	59,100	59,100	59,100	59,100	59,100	59,100	59,100	59,100	59,100
	Balance	-316,800	-375,900	-435,000	-494,100	-553,200	-612,300	-671,400	-730,500	-789,600	-848,700	-907,800	-966,900

Table 2-16: Adjusted Quantity to be Supplied (Phase III)

Item	Needed Quantity	Adjusted Quantity to be Supplied	Packing Unit
Rifampicin 150 mg+ Isoniazid 75 mg	40,051,330 tablets	59,601 boxes	672 tablets (28 tablets×24 sheets) per box
Pyrazinamide 400 mg	13,097,844 tablets	19,491 boxes	672 tablets (28 tablets×24 sheets) per box
Ethambutol 400 mg	7,228,930 tablets	10,758 boxes	672 tablets (28 tablets×24 sheets) per box
Streptomycin 750 mg	58,215 vials	59,000 vials	1,000 vials
Rifampicin 60 mg + Isoniazid 30 mg + Pyrazinamide 150 mg	123,210 tablets	124,000 tablets	1,000 tablets
Rifampicin 60 mg + Isoniazid 30 mg	247,420 tablets	248,000 tablets	1,000 tablets

3. Distribution Plan

Table 2-17 shows the distribution plan of cold chain (freezers and refrigerators). Vaccines (Measles, OPV and Hepatitis B), syringes, safety boxes, and temperature monitoring devices will be delivered from Central Medical Stores (hereinafter to be referenced as “CMS”) according to the size of target population and the quantity consumed as reported by each Operational District.

Table 2-17: Distribution Plan

No	Province and Operational District	No. of health center	Icelined Refrigerator, Large	Icelined Refrigerator, Small	Chest Freezer, Large
I	**B.M.CHEY**				
1	MONKUL BOREY	19	1		
2	O CHROV	10			
3	THMOR PUOK	12			
4	PREAH NETH PREAH	12	1		
	TOTAL	53	2	0	0
II	**BATTAMBANG**		1		
5	BATTAMBANG	22			
6	SANG KE	15	1		
7	THMOR KOL	17			
8	MONG RUSSEY	13			
9	SAMPOV LOUN	7	1		
	TOTAL	74	3	0	0
III	**KG. CHAM**				
10	KAMPONG SIEM	23			
11	CHAMKAR LEU	13			
12	CHOEUNG PREY	13			
13	KRAUCH CHHMAR	9			
14	MEMOT	8			
15	O RAING OV	8			
16	PONHEAKREK	14			
17	PREY CHHOR	15			
18	SREY SANTHOR	13			
19	TBONG KHMUM	13			
	TOTAL	129	0	0	0
IV	**KG.CHHNANG**				
20	KG.CHHNANG	23	1		
21	KG.TRALACH	11			
	TOTAL	34	1	0	0
V	**KG.SPEU**				
22	KG. SPEU	22			1
23	KONG PISSEY	19			
24	OU DONG	9	1		
	TOTAL	50	1	0	1
VI	**KG .THOM**				
25	KG.THOM	21	1		
26	BARAY	19			
27	STAUNG	10			
	TOTAL	50	1	0	0
VII	**KAM POT**				
28	KAMPOT	10			
29	ANKORCHEY	10	1		
30	CHHOUK	15	1		
31	KG.TRACH	12			
	TOTAL	47	2	0	0

VIII	**KANDAL**		3		1
32	TAKHMAO	14	1		
33	KEAN SVAY	17			
34	KHSACH KANDAL	9	1		
35	KOH THOM	12	1		
36	MUK KAMPOUL	6	1		
37	ANG SNUOL	8			
38	PONHEA LOEU	10	1		
39	SAANG	12			
	TOTAL	**88**	**8**	**0**	**1**
IX	**KOH KONG**				1
40	SRE AMBIL	6	1		
41	SMACH MEAN CHEY	6			
	TOTAL	**12**	**1**	**0**	**1**
X	**KRATIE**				
42	CHHLONG	10	1		
43	KRATIE	12	1		
	TOTAL	**22**	**2**	**0**	**0**
XI	**MONDUL KIRI**		1		
44	SEN MONORUM	**6**			
	(+ 6 Health posts)				
	TOTAL	**6**	**1**	**0**	**0**
XII	**PHNOM PENH**		2		1
45	CHAMKAR MORN (kandal)	10			
46	TUOL KORK (lech)	10			
47	MEAN CHEY (tbong)	9			
48	DAUN PPENH (choeung)	8			
	TOTAL	**37**	**2**	**0**	**1**
XIII	**PREAH VIHEAR**		1		
49	PREAH VIHEAR	**12**			
	TOTAL	**12**	**1**	**0**	**0**
XIV	**PREY VENG**		2		1
50	KAMCHAY MEAR	11			
51	KG.TRABEK	11	1		
52	MESANG	10			
53	NEAKLOEUNG	17			
54	PEA RAING	15	1		
55	PREAH SDACH	9	1		
56	PREY VENG	17	1		
	TOTAL	**90**	**6**	**0**	**1**
XV	**PURSAT**				
57	SAMPOV MEAS	21	1		
58	BAKAN	10	1		
	TOTAL	**31**	**2**	**0**	**0**

XVI	**RATTANAKIRI**		1		
59	RATTANAKIRI	10			
	(+17 health posts)				
	TOTAL	10	1	0	0
XVII	**PAILIN**		1		
60	PAILIN	3			
	TOTAL	3	1	0	0
XVIII	**SIEMREAP**				1
61	SIEMREAP	29	1		
62	PUORK ANGKOR CHUM		1		
63	KRAR LANH	7			
64	SOTHR NIKUM	17			
	TOTAL	53	2	0	1
XIX	**SIHANOUK VILLE**				
65	SIHANOUK VILLE	11			
	TOTAL	11	0	0	0
XX	**STUNG TRENG**		1		
66	STUNG TRENG	10			
	TOTAL	10	1	0	0
XXI	**SVAY RIENG**		1		
67	SVAY RIENG	20	1		
68	CHI PHOU	8	1		
69	ROMEAS HEK	9			
	TOTAL	37	3	0	0
XXII	**TAKEO**		2		1
70	DAUNKEO	15	1		
71	ANGROKA	9	1		
72	BATI	13	1		
73	KIRIVONG	20	1		
74	PREY KABASS	13	1		
	TOTAL	70	7	0	1
XXIII	**KEP**		1		
75	KEP	4			
	TOTAL	4	1	0	0
XXIV	**ODAR MEAN CHEY**		1		
76	SAMRONG	10			
	TOTAL	10	1	0	0
	National Hospitals and NIP, MOH			5	
	Grand Total	943	50	5	7

2-2-3 Implementation Plan

2-2-3-1 Implementation Policy

Equipment for this Project will be procured from the manufacturers in Japan, Cambodia, and third countries, among whom public tenders will be held. Eligible tenderers will be Japanese trading firms incorporated and registered under the law of Japan. Pre-shipment inspection for third-country products will be conducted by independent inspection agency assigned by the consultant. As for vaccines, anti-TB drugs, and other items that need strict quality control, the procurement supervisor will inspect them before shipment and at the time of delivery to each project site.

The NIP of the Ministry of Health and CENAT will be in charge of supervising the distribution, operation, and maintenance of the equipment, while CMS will be directly responsible for the actual transportation of the equipment.

2-2-3-2 Implementation Conditions

Certain difficulties are expected in procuring large volumes of vaccines[26]. Since changes in vaccine suppliers after the signing of the supplier contract, as well as delays in delivery, are more or less expected, the production status of vaccines should be closely monitored so that immediate actions can be taken as necessary.

Vaccines will be transported by air to Phnom Penh International Airport. Other items will be delivered via ocean to and discharged at Sihanouk Ville Port, and transported by land to the handover site (CMS in Phnom Penh). Transportation of the equipment from CMS to their final destinations is the responsibility of the Cambodian side.

Those items requiring temperature control should be properly packaged and promptly transported and inspected so as not to affect their qualities. The Cambodian side is encouraged to ensure prompt customs clearance procedures and

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[26] Problems in vaccine procurement: This Project will procure vaccines from the manufactures whose product qualities have been pre-qualified by WHO. However, sources of reliable vaccines are becoming scarce recently, as some large European vaccine makers decided not to participate in ODA projects due to irregular orders and restrictions on procurement timeframe. To secure a sufficient level of competition under these circumstances, this Project needs to include other vaccine manufacturers from Indonesia, India, etc, some of which, however, although they are WHO pre-qualified, were suspended from production by WHO because of poor-quality vaccines or had their WHO certification revoked due to improper quality control. Also, the production capacities of these companies are limited. Therefore, in procuring large volumes of vaccines for grant aid projects that have certain restrictions on the time frame of procurement, these contingent factors need to be well taken into account.

handover to CMS.

2-2-3-3 Scope of Works

Table 2-18 below shows the division of work between Japan and Cambodia.

Table 2-18: Scope of Works

Country	Scope of Works
Japan	Procurement of equipment Transportation of equipment to handover site (CMS in Phnom Penh)
Cambodia	Distribution of equipment from handover site (CMS in Phnom Penh) to target facilities

2-2-3-4 Consultant Supervision

One inspector from the equipment supplier will be dispatched from Japan to supervise the pre-shipment inspection of vaccines and anti-TB drugs. Also, one procurement supervisor will be dispatched from the equipment supplier to oversee the acceptance inspection, sorting-out, and handover of the equipment at the time of their arrival in Cambodia.

2-2-3-5 Procurement Plan

The table 2-19 below shows the sources from which major equipment items for this Project will be procured.

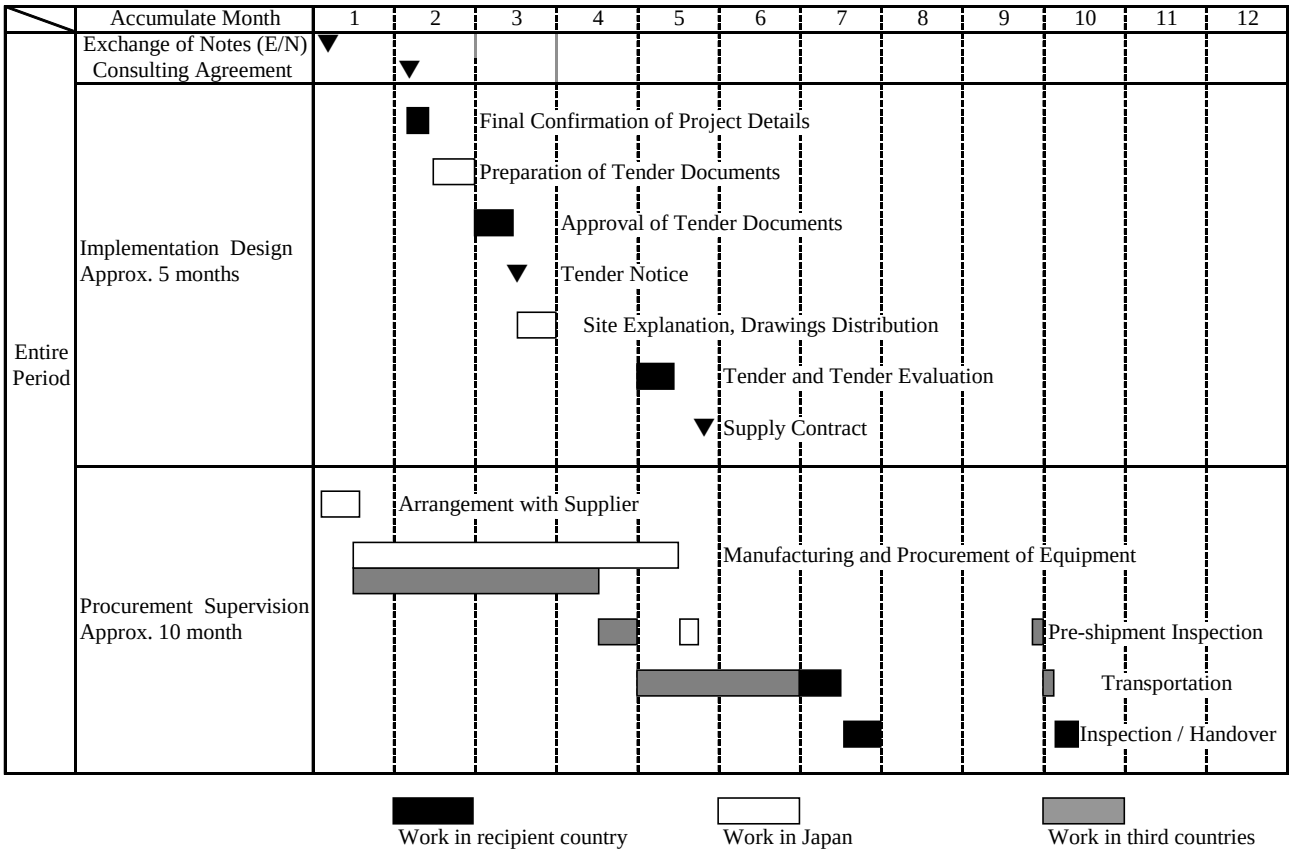
Table 2-19: Sources of Equipment and Supplies

Equipment	Cambodia	Japan	3rd country	Reason
Vaccine			□	Shall be sourced from manufactures that have been pre-qualified by WHO. There are no such manufacturers in Japan or Cambodia.
Auto-disable syringe			□	WHO quality standards products are manufactured in several European countries but not in Cambodia or Japan.
Disposable syringe		□		Produced by more than one Japanese manufacturer but not in Cambodia.
Safety box			□	WHO quality standards products are not manufactured in Cambodia or Japan.
Cold-chain equipment • Icelined refrigerator • Chest freezer • Cold box • Vaccine carrier • Temperature monitoring equipment			□	WHO quality standards products are not manufactured in Japan or Cambodia. They will probably be procured from Europe or other third countries.
Anti-TB drug			□	Since TB drugs officially recommended by GDF are not manufactured in Japan or Cambodia, they will be procured from India, China or other third countries.

2-2-3-6 Implementation Schedule

Work schedule

Total period of work (from E/N to delivery)	:	15 months
From E/N to supply contract	:	5 months
Time of delivery (from supply contract to delivery)	:	10 months



2-3 Obligation of Recipient Country

The undertakings of the Cambodian side in implementing this Project consist of the following:

① To ensure proper and prompt customs clearance procedure for the equipment to be procured under this Project.

② To secure storage spaces necessary to keep the equipment to be procured under this Project, taking special precautions for properly maintaining the quality of the anti-TB drugs.

③ To ensure prompt distribution the equipment to their final destinations by keeping close communications with the CMS personnel in charge, as well as the staff of the target facilities.

④ To make necessary appropriations and employ an adequate number of personnel for the proper operation and maintenance of the equipment.

⑤ To check the status of the distribution and use of the equipment.

These tasks have already been undertaken by the Cambodian Ministry of Health in implementing the 2001-2005 of Immunization 5-Year Work Plan and the National Health Strategic Plan for Tuberculosis Control 2001–2005 and are currently being carried out under the assistance of WHO and UNICEF. Therefore, the Cambodian side is deemed capable of continuing these activities without major difficulties.

2-4 Project Operation Plan

The cold chain equipment to be procured by Phase II for immunization activities will be installed in the Provincial Health Districts, National Hospitals in Phnom Penh, and Operational Districts. At present, each health facility is properly storing vaccines by assigning personnel to periodically monitor the refrigerators and freezers by measuring and recording inside temperatures daily. Each Provincial Health District employs at least one trained engineer, and each Provincial Health District or Operational District has an assigned staff that can perform basic maintenance work. Complicated repair works are done at the repair shop of the equipment manufacturer in Phnom Penh. Spare parts are usually supplied by Operational District, or are available for purchase in each Operational District in case the Health Offices are out of stock. In addition, UNICEF and other donor organizations are extending assistance in the procurement of spare parts.

Distribution and injection of the vaccines to be procured by Phase III will be carried out using the existing systems. Currently, vaccines are transported from the central storehouse to the Provincial Health Districts by CMS on the average of once in every three months. Each Provincial Health District delivers vaccines once a month by their pickup truck to the Operational Districts, wherefrom each Health Center equipped with a refrigerator receives a monthly supply. Health Centers, which were provided with small gas/electric refrigerators/ freezers by Phases I and II, are already conducting staff training in accordance with the guidelines on the improvement of the procurement, storage, and transportation of vaccines, as well as the education/training strategies for health workers, that were established in conjunction with WHO.

After each immunization activity, a large quantity of auto-disable syringes needs to be discarded. Cambodia began

using incinerators in 1998 under the guidance of WHO Western Pacific Region Office (WPRO), has already developed operational manuals of incinerators, and is conducting staff training. Therefore, collection and incineration of used syringes should be carried out without major difficulties under the current system.

The tuberculosis control activities will also utilize the current systems in Cambodia as much as possible. CENAT is the implementation agency of the National Health Strategic Plan on TB Control that plans to expand DOTS. TB control activities, including free diagnosis and treatment, are carried out by CENAT in close coordination with Provincial Health Districts, Operational Districts, referral hospitals, and Health Centers. Since the implementation and administration systems of DOTS programs are adequately in place on the central, provincial, and Operational District levels, the tuberculosis control activities should be managed and maintained properly.

2-5 Cost of Estimation for the Project

2-5-1 Cost Estimation for the Assistance Project

The total implementation cost of this assistance project is estimated at 278 million yen. The expenses to be borne by the Japanese and the Cambodian side according to the division of work defined above and based on the parameters listed below are estimated as follows.

This cost estimate is provisional and would be further examined by the Government of Japan for the approval of the Grant.

1. Expenses to be Borne by the Japanese Side

Estimated Total Project Cost Approx. 278 million yen

Item		Estimated Project Cost (in million yen)	
Equipment	NIP	106	262
	TB Control	156	
Detail design, procurement supervision, technical guidance			16
Total			278

2. Expenses to be Borne by the Cambodian Side

None (No additional cost will be incurred for transporting the equipment and supplies, as they will be delivered along with other medical supplies and equipment using the regular distribution routes of the Ministry of Health.)

3. Parameters of Cost Estimation

Time of calculation : March 2005

Exchange rate : 1 US dollar = 105.25 yen

US dollar was used in the cost estimation, as the currency is widely used in Cambodia.

2-5-2 Operation and Maintenance Costs

Of the cold-chain equipment to be procured by this Project, ice-lined refrigerators and chest freezers will incur maintenance cost. Utility and repair costs of the refrigerators to be newly installed in the National Hospitals will be paid by the hospitals' revenues from beneficiaries' fees for medical services. In case of Provincial Health Districts and Operational Districts, such costs will be covered by the operation/maintenance cost of each Provincial Health Districts.

In the budget of NIP, the operation/maintenance cost of freezers and refrigerators are included in the "operation and maintenance cost," which is distributed among the Provinces. The operation/maintenance cost in 2006 is projected to increase by about 16%, indicating NIP's continued ability to operate and maintain the new equipment.

Table 2-20: Budget of NIP (itemized)

（in US$）

	2003	2004	2005	2006
Vaccines (for routine vaccinations)	1,354,600	1,545,012	2,098,304	2,820,018
Syringes, etc.	232,076	236,198	240,843	516,861
Labor	962,374	1,046,824	1,119,710	1,432,459
Transportation	101,568	122,747	144,418	88,008
Operation and maintenance	288,750	303,188	318,347	370,089
Short-term training	140,760	147,794	155,188	95,281
Public relations	410,000	395,500	453,250	98,229
Monitoring / epidemiological surveillance	122,049	128,152	134,559	307,618
Vehicles	441,667	390,849	410,392	-
Cold chain equipment	948,320	510,091	535,880	58,499
Additional campaign expenses	0	598,941	684,814	1,886,962
Other	196,980	3,859	0	16,979
Total	5,199,144	5,429,155	6,295,705	7,691,003

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

1) Direct Effect

① Procurement of measles vaccines by this Project will enable the implementation of the measles campaign in 2006 for about 146 million children under 5, thereby reducing the susceptible population that escape routine immunization programs, preventing the outbreak of measles to achieve the goal for measles elimination from the West Pacific Region by 2012.

② Procurement of OPV will enable the implementation of anti-polio campaigns for about 300,000 children under 5 living in high-risk areas, preventing the incidence of polio.

③ Procurement of hepatitis B vaccines will allow about 370,000 neonates to receive vaccination immediately after birth under nation-wide routine immunization programs.

④ Provision of freezers and refrigerators for the Provincial Health Districts, which have been lacking vaccine storage capacities due to the expansion of the target population of immunization and coverage especially when campaign is carrying out, and for the Operational Districts in newly-electrified areas, will expand their capacities to store vaccines in proper temperature ranges, thereby reducing wastage.

⑤ Procurement of autodisable syringes that prevent reuse, as well as safety boxes for the safe disposal of used syringes, will establish an integrated system to safely carry out immunization activities to eliminate the reuse or improper disposal of used syringes and needles that could cause the spread of HIV and hepatitis B infections.

⑥ Procurement of a sufficient quantity of anti-TB drugs for adults will ensure uninterrupted treatment for about 39,000 adult TB patients and enable to offer more appropriate treatment for about 1,300 infant TB patients, which is 1.5 times more than the previous year.

2) Indirect Effect

① Expanded and upgraded cold chain system will reduce the wastage of vaccines thereby cutting the vaccine purchase cost of the Cambodian Health Ministry.

② Improved medical service quality on community levels will lower the morbidity of major diseases, leading to the reduction of medical expenditures.

③ Reduction of TB patients, many of whom belong to the most socially-productive age groups, will contribute to the socio-economic development and poverty reduction in Cambodia.

3-2 Recommendations

Although the Ministry of Health is deemed highly capable of properly implementing this Project, its success will be further ensured if conscious efforts are made on the following points:

1) The new CMS in Phnom Penh should be directed to enforce strict control of pharmaceuticals and make deliveries to each Operational District without error or delay.

2) The treatment default rate of TB should be minimized to prevent the generation of drug-resistant TB bacillus strains.

3) All used auto-disable syringes must be collected from the vaccination sites and properly incinerated to prevent secondary infection.

4) Health Centers staff should be trained rigorously in the proper storage and control of vaccines to further reduce wastage.

[Appendix]-1 Member List of the Study Team

Leader

Mr. Hiroto MITSUGI

Deputy Resident Representative, Japan International Cooperation Agency Cambodia Office

Equipment Planner

Ms. Etsuko TOYOSHIMA

Japan International Cooperation System

Procurement/Cost Estimation Planner

Ms. Tomoko NIKAI

Japan International Cooperation System

[Appendix]-2 Study Schedule

No.	Date		Itinerary	Accomm.
1	2/21	Mon	10:45 Tokyo →15:45 Bangkok (TG641) 17:30 Bangkok →18:45 Phnom Penh (TG698)	Phnom Penh
2	2/22	Tue	Meeting, JICA, Courtesy call on Embassy of Japan Courtesy call on Ministry of Health Meeting (NIP)	Phnom Penh
3	2/23	Wed	Internal Meeting	Phnom Penh
4	2/24	Thu	Meeting, (NIP)	Phnom Penh
5	2/25	Fri	Meeting (CENAT)	Phnom Penh
6	2/26	Sat	Meeting (CENAT)	Phnom Penh
7	2/27	Sun	Discussion on M/D	Phnom Penh
8	2/28	Mon	Discussion on M/D (NIP) Site surbey (New CMS) Report (JICA)	Phnom Penh
9	3/1	Tue	Discussion on M/D (MHO, NIP, CENAT) Signing of M/D	Phnom Penh
10	3/2	Wed	Meeting (NIP)	Phnom Penh
11	3/3	Thu	Site Survey (Mean Chey Health Center, Chamcar Daung Health Center, Phnom Penh; Home Delivery DOTS) Meeting (NIP)	Phnom Penh
12	3/4	Fri	Meeting (CENAT) Site Survey (Saang Health Center, Kandal) Meeting (NIP, JICA)	Phnom Penh
13	3/5	Sat	Internal Meeting	Phnom Penh
14	3/6	Sun	09:35 Phnom Penh → 10:35 Rattanakiri (U4 129) Meeting (Provincial Health District, Rattanakiri)	Rattanakiri
15	3/7	Mon	Site Survey, EPI review (Kachaun Health Center, Rattanakiri)	Rattanakiri
16	3/8	Tue	Site Survey, EPI review (O Ya Dao Health Center, Rattanakiri)	Rattanakiri
17	3/9	Wed	Site Survey (Provincial Health District, Rattanakiri) 11:30 Rattanakiri → 12:30 Phnom Penh Meeting (Health Sector Support Project)	Phnom Penh
18	3/10	Thu	Site Survey (Provincial Health District, Staung Operational District, Sandoc Ao Krayea Sakrem Health Center, Dong Health Center, Kampong Thom)	Phnom Penh
19	3/11	Fri	Site Survey (Provincial Health District, Phnom Penh)	Phnom Penh
20	3/12	Sat	Internal Meeting	Phnom Penh
21	3/13	Sun	Internal Meeting	Phnom Penh

22	3/14	Mon	Meeting, EPI review (EPI) Report (JICA) 20:25 Phnom Penh →21:30 Bangkok (TG699) 23:40 Bangkok →	In flight
23	3/15	Tue	→07:30 Tokyo (TG642)	

[Appendix]-3 List of Parties Concerned in the Recipient Country

1. Embassy of Japan

Ms. Chinami HANAZONO	Special Advisor

2. JICA Cambodia Office

Mr. Hiroto MITSUGI	Deputy Resident Representative

3. Ministry of Health

Prof. Eng Hout	Secretary of State for Health
Dr. Sann Chan Soeung	Manager, MIP
Dr. Chea Kim Ly	Deputy Manager , NIP
Ms. Ly Nareth	Deputy Manager , NIP
Dr. Mao Tang Eang	Director, CENAT
Dr. Tieng Sivanna	Deputy Chief of Technical Bureau, CENAT
Mr. Chay Sokun	Technical Bureau officer, CENAT
Mr. Kou Soum Mardy	Technical Bureau officer, CENAT
Dr. Kong Kim San	TB project Supervisor, CENAT
Mr. Chea Chhiv Srong	Director, CMS

4. JICA National Tuberculosis Control Project

Dr. Kosuke OKADA	Chief Advisor
Dr. Yuta UCHIYAMA	Drug Management Advisor

5. Provincial Health District, Phnom Penh

Dr. Seanly	Provincial TB Manager
Mr. Chim Polina	Pharmacist

6. Chamcar Daung Health Center, Phnom Penh

Mr. Nil Sinath	Nurse

7. Saan Health Center, Kandal

Dr. Lean Chhyv Ann	Deputy Director
Mr. Ross Rom	Person Responsible, Incinerator

8. Takhmao Hospital, Kandal

Dr. Kong Chuunly	Director

9. Provincial Health District, Rattanakiri

Mr. Sin Sonlay	Director
Mr. Sim Sen	NIP Provincial Manager
Dr. Nget Botra	MCH Chief

10. Kachaun Health Center, Rattanakiri

Mr. Mey Soy	Chif
Ms. Ly Bora	EPI staff

11. O Ya Dao Health Center, Rattanakiri

Mr. Rur Cham Chan	Director
Mr. Rur Cham Voan	EPI staff
Ms. Sav Phet	MCH staff
Ms. Long Sothear	MCH staff
Mr.. Sav Han	Labo staff
Mr. Sav Toan	TB staff

12. Provincial Health District, Kampong Thom

Mr. Meas Sokha	Deputy Director
Mr. Sok Lay Sreng	EPI Manager
Mr. Khy Seik Leang	EPI staff

13. Staung Operational District

Mr. Tek Bunchhoeung	Pharmacist

14. Sandoc Ao Krayea Sakrem Health Center

Mr. Chhun Sok	Secondary Nurse
Mr. Im Sam	Primary Nurse

15. Dong Health Center, Kampong Thom

Mr. Uth En	Secondary Nurse

16. Health Sector Support Project

Mr. Uy Vengky	Consultant

17. WHO/WPRO

Dr. Yoshikuni SATO	EPI Medical Officer, WPRO
Mr. Hisakazu HIRAOKA	EPI Technical Officer, WPRO

18. WHO Representative Office

Dr. James L. Tulloch	Representative
Dr. Kohei TODA	WHO/EPI Technical Officer

MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY ON
THE PROJECT FOR INFECTIOUS DISEASES CONTROL
IN THE KINGDOM OF CAMBODIA

In response to a request from the Government of the Kingdom of Cambodia (hereinafter referred to as "Cambodia"), the Government of Japan decided to conduct a Basic Design Study on the Project for Infectious Diseases Control (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Cambodia the Basic Design Study Team (hereinafter referred to as "the Team"), which is headed by Mr. Hiroto Mitsugi, Deputy Resident Representative, JICA Cambodia Office, and is scheduled to conduct the study from February 21st to March 14th 2005.

The Team held discussions with the officials concerned of the Government of Cambodia and conducted a field survey at the study area.

In the course of discussions and field survey, both parties confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.

Phnom Penh, March 1, 2005

Mr. Hiroto Mitsugi
Leader
Basic Design Study Team
Japan International Cooperation Agency
Japan

Prof. Eng Huot
Secretary of State for Health
Ministry of Health
The Kingdom of Cambodia

(Witnessed by)

Dr. James Tulloch
Representative in Cambodia
World Health Organization

ATTACHMENT

1. Objective of the Project

The objective of the Project is to accelerate the National Immunization Program (NIP) and National Tuberculosis Programme (NTP) implemented by the Government of Cambodia and to reduce the morbidity and mortality caused by vaccine preventable diseases and tuberculosis in the Project sites.

2. Project sites

The sites of the Project are all areas in Cambodia where the NIP and NTP are being implemented.

3. Responsible and Implementing Agency

The Ministry of Health is both the responsible and implementing agency.

4. Items requested by the Government of Cambodia

After discussions with the Team, the items described in Annex-1 were requested by the Government of Cambodia with priorities on the items as "A: Necessary" and "B: If possible". JICA will assess the appropriateness of the request including quantity of each item and scale of the Project based on the budget availability and will recommend to the Government of Japan for approval.

5. Japan's Grant Aid Scheme

5-1. The Government of Cambodia understands the Japan's Grant Aid Scheme explained by the Team, as described in Annex-2.

5-2. The Government of Cambodia will take the necessary measures, as described in Annex-3, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Study

6-1. The Team will proceed to further studies in Cambodia until 14th March 2005.

6-2. Based on the Minutes of Discussions and technical examination of the study results, JICA will complete the final report and send it to the Government of Cambodia by July 2005.

7. Other relevant issues

7-1. Both sides agreed that the Government of Cambodia is responsible for distribution and utilization of the equipment and materials procured under the Project from the Central Medical Store (CMS) to the project sites. The Government of Cambodia shall allocate necessary budget and personnel for the implementation of the Project. In this regard, the Government of Cambodia is required to ensure proper stock management at CMS.

7-2. The Government of Cambodia shall operate and maintain the items procured under the three consecutive phases of Grant Aid Projects properly and effectively.

7-3. Both sides agreed that the Project shall be implemented in collaboration with CENAT/JICA Tuberculosis Control Project, WHO and UNICEF and especially requested WHO to provide technical support in NIP particularly measles elimination and hepatitis B control activities.

7-4. Considering the epidemiological status of measles after SIAs (Supplementary Immunization Activities) conducted in 2000-2004, the Government of Cambodia decided to conduct the measles immunization campaign in 2006/07 as an inevitable step for measles elimination and requested the measles vaccines to the Team.

7-5. The Team explained that this will be the final phase of the three consecutive phases of Grant Aid Projects and expressed the hope that the Government of Cambodia shall take necessary measures to allocate budget to continue implementing the NIP and NTP in Cambodia after the Project terminates.

7-6. While the Government of Cambodia expressed its effort to sustain the activities of NIP and NTP, the government strongly requested the further assistance of Japan in combating Infectious Diseases in order to attain the Millennium Development Goals. The government recognizes the difficulty to reach the goals without the support from Japan under the limited financial capacity of the government.

7-7. The Government of Cambodia shall take necessary measures to exempt Japanese nationals who will be engaged in the Project from all duties and related fiscal charges which may be imposed in Cambodia with respect to the import and local procurement of equipment and services supplied under the verified contract.

Annex-1

No.	Item	Quantity	Priority
1	Measles Vaccine	1,940,000 doses	A
2	Oral Polio Vaccine	810,000 doses	A
3	Hepatitis B Vaccine	90,000 doses	A
4	Autodisable Syringe	1,620,000 pcs.	A
5	Disposable Syringe	194,000 pcs.	A
6	Safety Box, Medium	19,000 pcs.	A
7	Icelined Refrigerator, Large	50 units	A
8	Icelined Refrigerator, Small	5 units	A
9	Chest Freezer, Large	7 units	A
10	Cold Box	20 units	A
11	Vaccine Carrier	1,000 units	A
12	Vaccine Thermometer	500 pcs.	A
13	Temperature Data Logger	24 units	A
14	Freeze Watch Indicator	500 pcs.	A
15	Refrigerator Monitor	3,000 pcs.	A
16	Cold Chain Monitor Card	2,000 pcs.	A
17	Desktop Computer System (for NIP)	3 sets	A
18	Lap Top Computer (for NIP)	2 sets	A
19	Printer (for NIP)	3 sets	A
20	Desktop Computer System (for province)	24 sets	B
21	Printer (for province)	24 sets	B
22	Rifampicin 150mg + Isoniazid 75mg	40,051,330 tablets	A
23	Pyrazinamide 400mg	13,097,844 tablets	A
24	Ethambutol 400 mg	7,228,930 tablets	A
25	Streptomycin Injection 750mg	58,215 units	A
26	Rifampicin 60mg + Isoniazid 30mg + Pyrazinamide 150mg	123,210 tablets	A
27	Rifampicin 60mg + Isoniazid 30mg	247,420 tablets	A

ANNEX-2 : JAPAN'S GRANT AID SCHEME

1. Grant Aid Procedure

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA to conduct a study on the request. If necessary, JICA send a Preliminary Study Team to the recipient country to confirm the contents of the request.

Secondly, JICA conducts the study (Basic Design Study), using Japanese consulting firms.

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Programme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. Basic Design Study

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project"), is to provide a basic

document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

a) confirmation of the background, objectives and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation;

b) evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from the technical, social and economic points of view;

c) confirmation of items agreed on by both parties concerning the basic concept of the Project;

d) preparation of a basic design of the Project; and

e) estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For the smooth implementation of the Study, JICA uses a consulting firm selected through its own procedure (competitive proposal). The selected firm participates the Study and prepares a report based upon the terms of reference set by JICA.

At the beginning of implementation after the Exchange of Notes, for the services of the Detailed Design and Construction Supervision of the Project, JICA recommends the same consulting firm which participated in the Study to the recipient country, in order to maintain the technical consistency between the Basic Design and Detailed Design as well as to avoid any undue delay caused by the selection of a new consulting firm.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant" means the one fiscal year which the Cabinet approves the project for. Within the fiscal year, all procedure such as exchanging of the Notes, concluding contracts with consulting firms and contractors and final payment to them must be completed.

However, in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However, the prime contractors, namely consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability of Japanese taxpayers.

6) Undertakings required to the Government of the recipient country

a) to secure a lot of land necessary for the construction of the Project and to clear the site;

b) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities outside the site;

c) to ensure prompt unloading and customs clearance at ports of disembarkation in the recipient country and internal transportation therein of the products purchased under the Grant Aid;

d) to exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts;

e) to accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work;

f) to ensure that the facilities constructed and products purchased under the Grant Aid be maintained and used properly and effectively for the Project; and

g) to bear all the expenses, other than those covered by the Grant Aid, necessary for the Project.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign the necessary staff for operation and maintenance of them as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

9) Banking Arrangement (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the verified contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of recipient country or its designated authority.

ANNEX-3 : UNDERTAKINGS BY THE GOVERNMENT OF THE RECIPIENT COUNTRY

1. To secure a lot of land necessary for the Project;

2. To clear and level the site for the Project prior to the commencement of the construction;

3. To provide a proper access road to the Project site;

4. To provide facilities for distribution of electricity, water supply, telephone trunk line and drainage and other incidental facilities outside the site;

5. To undertake incidental outdoor works, such as gardening, fencing, exterior lighting, and other incidental facilities in and around the Project site, if necessary;

6. To ensure prompt unloading and customs clearance of the products purchased under the Japan's Grant Aid at ports of disembarkation in the Recipient Country;

7. To exempt Japanese nationals from customs duties, internal taxes and fiscal levies which may be imposed in THE RECIPIENT COUNTRY with respect to the supply of the products and services under the verified contracts;

8. To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the verified contracts such facilities as may be necessary for their entry into THE RECIPIENT COUNTRY and stay therein for the performance of their work;

9. To bear commissions, namely advising commissions of an Authorization to Pay (A/P) and payment commissions, to the Japanese foreign exchange bank for the banking services based upon the Banking Arrangement (B/A);

10. To provide necessary permissions, licenses, and other authorization for implementing the Project, if necessary;

11. To ensure that the facilities constructed and equipment purchased under the Japan's Grant Aid be maintained and used properly and effectively for the Project; and

12. To bear all the expenses, other than those covered by the Japan's Grant Aid, necessary for the Project.

Annex-3 Major Undertakings to be taken by Each Government

NO	Items	To be covered by Grant Aid	To be covered by Recipient
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
1) Advising commission of A/P			●
2) Payment commission			●
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
1) Marine(Air) transportation of the products from Japan to the recipient country		●	
2) Tax exemption and custom clearance of the products at the port of disembarkation			●
3) Internal transportation from the port of disembarkation to the project		●	●
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their		●
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		●

[Appendix]-5 References

No.	References	Issued by	Year	original/ copy
1	National Health Statistics 2003	Ministry of Health	2004	original
2	National Immunization Program Plan 2005-2007	Ministry of Health	2004	copy
3	Measles Bulletin	WHO/WPRO	2004	original
4	Annual Report (2004) on TB Control Program	Ministry of Health	2004	original
5	Record of Discussions CENAT/JICA TB Control Project Phase II August 2004-July 2009	Ministry of Health	2004	copy
6	National Workshop on TB Drug Management	Ministry of Health	2003	copy