

Appendix 1. Catalogue of noteworthy outputs in the field of infectious disease control

List of noteworthy outputs

#	Category	Name of noteworthy outputs	Project name	Assistance scheme	Country	Page
1	Institutions/ Policies (4 cases)	National guidelines for anti-tuberculosis management, including standard operating procedures (SOP) for external quality assessment (EQA)	Tuberculosis Control Project in Pakistan (2006-2009)	Technical cooperation project	Pakistan	4
2		SOP (standard operating procedure) with LQAS (lot quality assurance system) including monitoring/supervision Note: this noteworthy output is also categorized as technology.	Tuberculosis Control Project (2008-2011)	Technical cooperation project	Indonesia	9
3		Implementation model of Chagas disease control (preparation-attack-monitoring phases) in Central America Note: this noteworthy output is also categorized as organizations.	Chagas Disease Control Program (1991-2014)	Technical cooperation project, deployment of experts, volunteer project	Guatemala, Honduras, El Salvador, Nicaragua	14
4		Production and sales system of locally produced inexpensive and high-quality alcohol hand sanitizer	Preparatory Survey on BoP Business on Infectious Disease Prevention with New Alcohol Hand Sanitizer (2012-2013)	Public-private partnership	Uganda	21
5	Organization (4 cases)	Comprehensive research and training capacity for infectious disease control at Noguchi Memorial Institute for Medical Research (NMIMR)	Infectious Diseases Project at NMIMR (1999-2003)	Technical cooperation project	Ghana	29
6		Biosafety level 3 laboratory and its maintenance system established at the University Teaching Hospital, the Ministry of Health, Zambia Note: this noteworthy output is also categorized as infrastructure.	Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis (2011-2016)	SATREPS	Zambia	34
3		Implementation model of Chagas disease control (preparation-attack-monitoring phases) in Central America Note: this noteworthy output is also categorized as Institutions/Policies.	Chagas Disease Control Program (1991-2014)	Technical cooperation project, deployment of experts, volunteer project	Guatemala, Honduras, El Salvador, Nicaragua	14

7		A national network of inspection agencies built around the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi	Project for Capacity Development for Laboratory Network in Vietnam of Biosafety and Examination of Highly Hazardous Infectious Pathogens (2011-2016)	Technical cooperation project	Viet Nam	40
8	Human resources (4 cases)	A total of 277 laboratory technicians having enhanced capabilities in 64 countries	Strengthening Laboratory Techniques and Surveillance System for Global Control of HIV and Related Infectious Diseases (1993-2019)	Knowledge Co-Creation Program	Worldwide	46
9		Human resources who can implement effective measures to address antimicrobial resistance (AMR) and healthcare-associated infections, including COVID-19	Antimicrobial Resistance and Healthcare-Associated Infections Control (2003~)	Knowledge Co-Creation Program	Worldwide	53
10		More than 1,700 human resources (in 92 countries) developed in the international tuberculosis training that has been conducted for nearly 60 years	International Training Courses on Tuberculosis Control (1963~)	Knowledge Co-Creation Program	Worldwide	58
11		Healthcare workers with enhanced capabilities to conduct surveys in line with the provisions of the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)	(Volunteer project) Support for Elimination of Lymphatic Filariasis: 14 Pacific countries in Oceania (2004-2015)	Volunteer project	14 Pacific countries	67
12	Infrastructure (3 cases)	Biosafety level 3 (BSL-3) laboratory	The Project for Improvement of Noguchi Memorial Institute for Medical Research (1998-1999)	Grant aid	Ghana	72
13		Hospitals, CDCs, and Emergency Care Centers with improved functions	Public Health Project (2004-2010)	ODA loan	China	77
6		Biosafety level 3 laboratory and its maintenance system established at the University Teaching Hospital, the Ministry of Health, Zambia Note: this noteworthy output is also categorized as organization.	Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis (2009-2013)	SATREPS	Zambia	34
14	Technology (7 cases)	Rapid diagnostic kits for Ebola virus disease	Project for Surveillance of Viral Zoonoses in Africa (2009-2013)	SATREPS	Zambia	83

2		SOP (standard operating procedure) with LQAS (lot quality assurance system) including monitoring/supervision Note: this noteworthy output is also categorized as institutions/policies.	Tuberculosis Control Project (2013-2018)	Technical cooperation project	Indonesia	9
15		The Campinas University Hospital's medical care manual including a rapid test method for fungal detection	The Project for New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients (2010-2013)	SATREPS	Brazil	89
16		Procedure manual in Portuguese on the DNA microarray, LAMP method, $\beta$ -glucan measurement, fungal susceptibility testing, and the real-time PCR method	The Project for New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients (2010-2013)	SATREPS	Brazil	89
17		Diagnostic techniques for infectious diseases including COVID-19	The Project for Development of Innovative Research Technique in Genetic Epidemiology of Malaria and Other Parasitic Diseases in Lao PDR for Containment of Their Expanding Endemicity (2014-2019)	SATREPS	Lao PDR	95
18		Lead compounds produced through joint research between Japan and Indonesia	Project for Searching Lead Compounds of Anti-malarial and Anti-amebic Agents by Utilizing Diversity of Indonesian Bio-resources (2015-2020)	SATREPS	Indonesia	101
19		Measles-rubella combined vaccines produced domestically in Vietnam	The Project for Strengthening Capacity for Measles-Rubella Combined Vaccine Production (2013-2018)	Technical cooperation project	Viet Nam	106

Noteworthy output 1. National guidelines for anti-tuberculosis management, including standard operating procedures (SOP) for external quality assessment (EQA)

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	National guidelines for anti-tuberculosis management, including standard operating procedures (SOP*) for external quality assessment (EQA**) * SOP is an abbreviation for Standard Operating Procedures, <i>Hyojun-sagyo-tejun</i> in Japanese. Refers to an instruction that details the procedures for work and operation. ** EQA is an abbreviation for External Quality Assessment, <i>Gaibu-seido-kanri</i> in Japanese. The same samples should be re-inspected by third party agency to ensure the inspection quality.
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Institutions/policies
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Technical cooperation project Region: Asia Approach to be taken (testing/research/early warning): Testing, early warning Infectious disease: Tuberculosis (TB)
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Tuberculosis is the largest single-pathogen disease and infects one-third of the world's population, with an estimation that 8 million people develop and 3 million people die each year. Factors accelerating the spread of this disease include an increase in tuberculosis patients due to the HIV/AIDS epidemic and an increase in drug-resistant tuberculosis caused by inappropriate and inadequate treatment. Under such circumstances, based on empirical research, an anti-tuberculosis management guideline, which is this noteworthy output, including the quality assessment method by an external organization, was developed, the network between inspection rooms was strengthened, and the quality assessment of the inspection was improved. The treatment success rate (TSR) of the entirety of Punjab, which is the target state, has improved up to 90% and the case detection rate (CDR) has improved up to 70%. Furthermore, it has great significance that the guidelines have been disseminated and used in all states in Pakistan.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	The use of the national guidelines has led to the achievement of the Project Purpose and the maintenance of similar achievements three years after the completion of the project. The use and dissemination of the national guidelines in other states also contributed to the nationwide declining mortality rate of pulmonary tuberculosis and extrapulmonary tuberculosis.
6. Main user	Identify users of the noteworthy output	Staff of the national TB program and the Punjab Program, staff of the inspection room of the University School of Medicine in charge of the EQA
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Tuberculosis patients and their families
8. Problem and	Whether or not the	By using this noteworthy output, the network between

issues solved	problems that were identified at the time of planning have been resolved.	inspection rooms has been strengthened and the quality assessment of inspections has been improved.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	Operational research was conducted in five districts of Punjab from June to July 2006, and the results were announced at international conferences after domestic ones.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which the noteworthy output was extracted: Tuberculosis Control Project in Pakistan  Cooperation period: April 2006-March 2009
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The noteworthy output is used for disseminating the Directly Observed Treatment, Short-course (DOTS) with good quality and strengthening the EQA system.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	Imposing the enacted national guidelines only would not have promoted the dissemination. In this project, the contents of the core DOTS SOP and the EQA were proved effective by operational research, and the good achievements were proactively disseminated by the Pakistani Counter Part (C/P), so even in other districts and outside the State, it has become possible to use this noteworthy output.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	Link: Evaluation at the end <a href="https://libopac.jica.go.jp/images/report/P0000248797.html">https://libopac.jica.go.jp/images/report/P0000248797.html</a> Ex-post evaluation <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2012_0602523_4_f.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2012_0602523_4_f.pdf</a>  JICA website <a href="https://www.jica.go.jp/oda/project/0602523/index.html">https://www.jica.go.jp/oda/project/0602523/index.html</a>

## 2) Project Outline

<b>Case (project) name</b>	
(Technical cooperation project) Tuberculosis Control Project in Pakistan	
<b>Background of case implementation</b>	
Pakistan has the eighth highest number of patients (as of 2006) among the 22 TB high-burden countries, and it is estimated that more than 200,000 people develop tuberculosis annually. One-quarter of them were found as patients and treated by public institutions, but untreated or incompletely treated patients became the source of infection and contributed to the increase in the number of patients. The government had endeavored to implement the Directly Observed Treatment, Short-course chemotherapy (DOTS), but in the situation of rapid spread of infection, it faced restrictions and challenges in improving the quality of DOTS implementation, such as strengthening of the network between inspection rooms, quality assessment of inspections, lack of resources necessary to expand DOTS by public institutions, the need for prefectural capacity development to strengthen and continue DOTS, and the need to detect tuberculosis patients. Under these circumstances, the Government of Pakistan requested JICA to cooperate in improving the effectiveness and efficiency of DOTS in order to expand the scope of DOTS and improve the quality of TB control programs.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal: Reduce tuberculosis mortality and morbidity. Project Purpose: A high-quality National TB Program (NTP) will be systematically implemented in collaboration with states and districts.
Outputs	1. The technical and operational capabilities of the Punjab Tuberculosis Program (PTP) unit have been strengthened. 2. The technical and operational capabilities of the NTP Unit and national references and inspection rooms have been strengthened.
Activities	Activity groups corresponding to each of the above outputs
Implementation period	April 2006-March 2009
Implementing agencies (Recipient country side)	National TB Program (NTP) Unit of the Ministry of Health and Family Welfare, Punjab TB Program (PTP) Unit of the Punjab State Health Bureau
Direct beneficiary	The counterpart participating in the project (Employees of the implementing agency)
Cooperating Japanese agency	Ministry of Health, Labor and Welfare, The Research Institute of Tuberculosis
Participating Japanese experts	Project Manager 3.9 people per month, Team Leader/tuberculosis control 30.2 people per month, inspection room management 26.1 people per month, drug management 5.9 people per month, advocacy data management 23.4 people per month, Operational Research 1.5 people per month, and DOTS linkage 0.9 people per month
<b>Case evaluation results (summary)</b>	
Judging comprehensively (from the ex-post evaluation "comprehensive evaluation"), it can be said that the evaluation of this project is very high. This project was targeted at the state of Punjab, where tuberculosis-related indicators are worse than in other regions. By enhancing the technical and operational capabilities of the NTP and the PTP through strengthening TB control in the four model districts of the State, systematic implementation of a high-quality NTP has become possible. As a result, the treatment success rate (TSR) and case detection rate (CDR) of the entire state of Punjab achieved the target values of 90% and 70% at the completion of the project, respectively, and maintained the same achievement status after the completion of the project. Regarding the Overall Goal of "decrease in tuberculosis mortality and morbidity at the national level," the morbidity of pulmonary tuberculosis and extrapulmonary tuberculosis in the whole country did not decrease between 2006 and 2011, but the mortality rate decreased from 3.4% in 2006 to 2.0% in 2011. Regarding the prospects for achieving the two tuberculosis-related indicators in the 2010 Millennium Development Goals Report, the morbidity of tuberculosis was 181 per 100,000 population in 2008/09, which is far from the target (45 by 2015), but the case detection rate and cure rate of tuberculosis patients increased to 85% in 2008-2009, reaching the target before 2015. Regarding sustainability, there were some problems in the systems, technology, and finance of the implementing agency. In terms of relevance, this project was in line with Pakistan's development policies and needs and Japan's aid policy, and also for efficiency, both the project cost and period were within the plan.	
<b>Major noteworthy output produced in this case</b>	
National guidelines for anti-tuberculosis management, including standard operating procedures (SOP) for external quality assessment (EQA)	

**The process by which the noteworthy output concerned was produced**

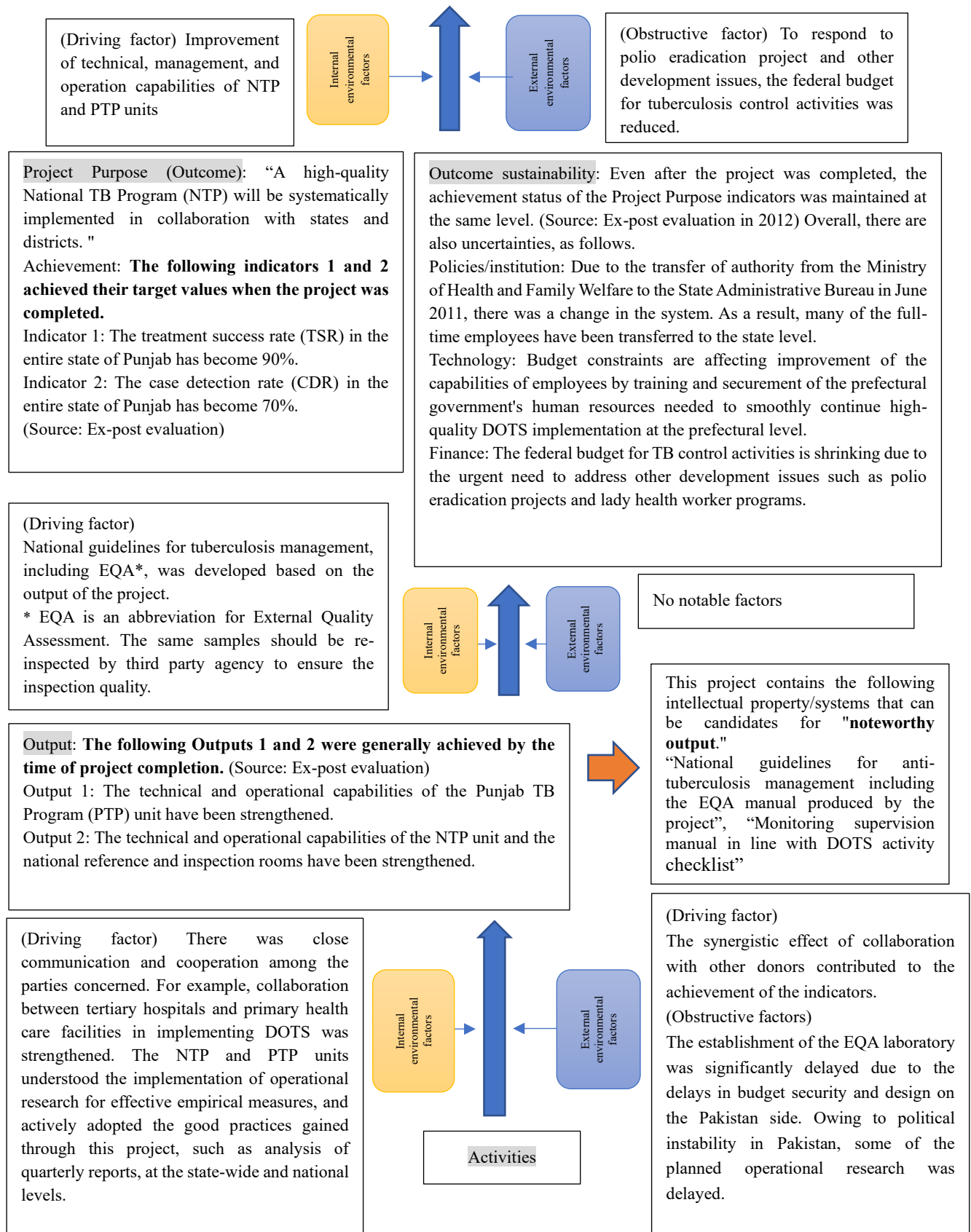
According to the recommendations at the time of the mid-term review, "National guidelines for anti-tuberculosis drug management will be prepared" was added as Indicator 6 of Output 2, and the production of the noteworthy output was promoted.

**Process by which the noteworthy output was used**

Regarding the national guidelines for anti-tuberculosis management, National TB Program (NTP) Unit of the Ministry of Health and Family Welfare gave an instruction to the staff in charge of the program of anti-tuberculosis management in states other than Punjab and the guidelines were used accordingly.

### 3) Logic Model

**Overall Goal (Impact):** Achievement: Among the Overall Goal items of "decrease in tuberculosis mortality and morbidity at the national level," the morbidity of pulmonary tuberculosis and extrapulmonary tuberculosis in the whole country did not decrease between 2006 and 2011, but the mortality rate decreased from 3.4% in 2006 to 2.0% in 2011. (Source: Ex-post evaluation)





Noteworthy output 2. SOP (standard operating procedure) with LQAS (lot quality assurance system) including monitoring/supervision

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	SOP (Standard operating procedure) with LQAS (lot quality assurance system)* including monitoring/supervision * It is a frame to monitor or evaluate whether a certain performance indicator is realized by using relatively small sample size in pre-defined observation area or facilities.
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Institutions/policies (national guidance), technology
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Technical Cooperation Region: Asia Approach to be taken (testing/research/early warning): Testing Infectious disease: Tuberculosis
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	The estimated number of tuberculosis patients in Indonesia was the third highest in the world according to the World Health Organization (WHO) report (2006). With the introduction of DOTS (Direct Observed Treatment Short-course) in the early 1990s, the rate of population in Indonesia to which DOTS is available reached 100% in 2007. However, there were still challenges in providing high quality DOTS. In other words with the rapid expansion of DOTS, it was recognized that there were problems in the examination/diagnosis system for tuberculosis patients. To solve the problems, the examination accuracy of the laboratories needed to be improved. A large effect can be expected by preparing standard procedures and ensuring the same level of accuracy control throughout the country.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	After the completion of the project, the Indonesian government confirmed the success of the pilot project in West Java and the effect of EQA (External Quality Assurance) with LQAS, and expanded EQA with LQAS. At the time of ex-post evaluation, the SOP for the new EQA developed in this project was referred to as national guidance, and all provinces have implemented EQA with the method developed in this project.
6. Main user	Identify users of the noteworthy output	Healthcare workers (laboratory technicians, tuberculosis officers, etc.)
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Local residents
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	With the rapid expansion of DOTS, it was recognized at the time of planning that there were problems in the examination/diagnosis system for tuberculosis patients. To solve the problems, the examination accuracy of the laboratories needed to be improved. As a result, it can be said that the problems were solved by achieving the project purpose indicator (70% or more of the diagnostic centers

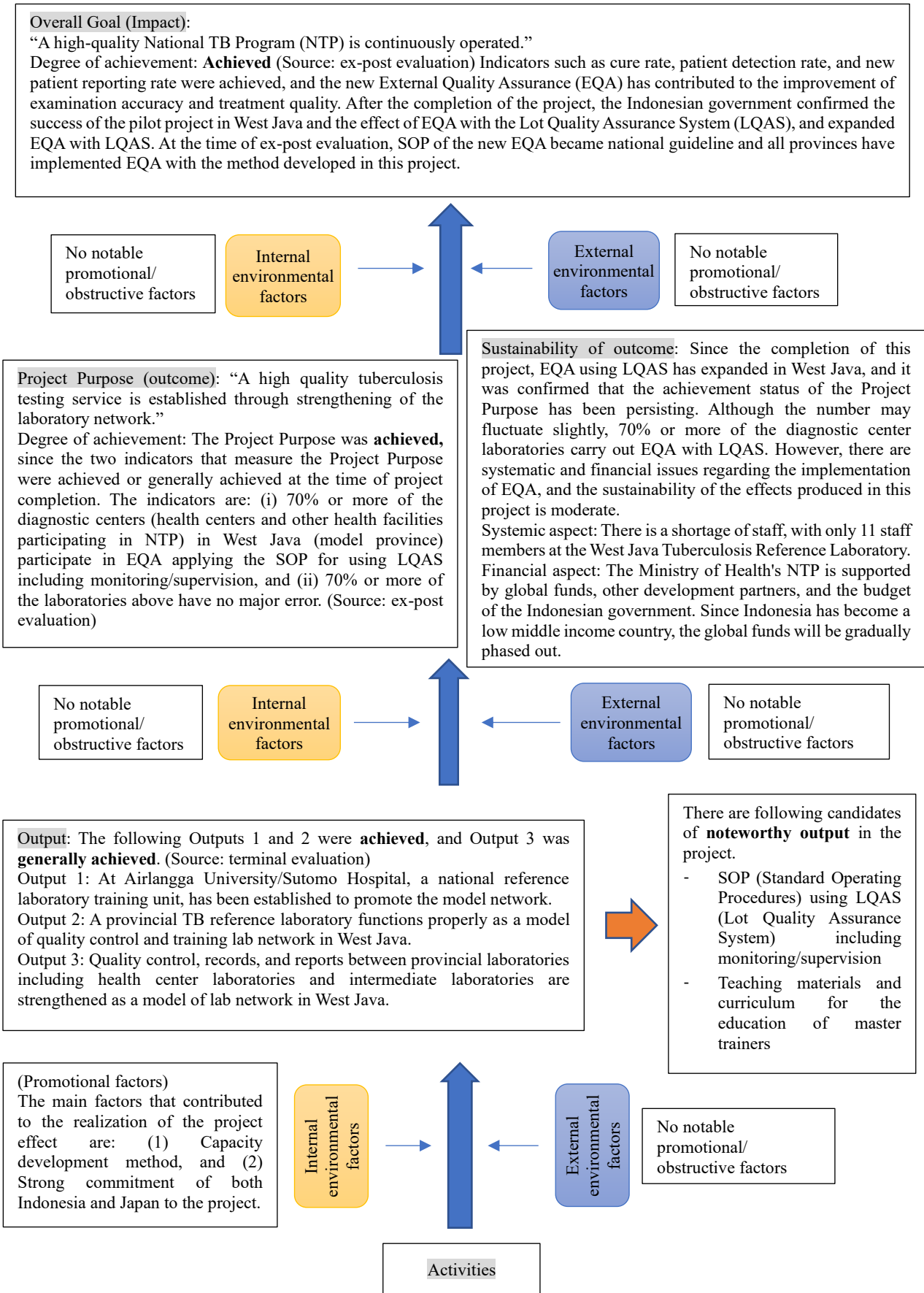
		(health centers and other health facilities participating in NTP*) in West Java have no major errors). *NTP: National TB Program
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The annual report on EQA was prepared and distributed throughout the province, so it was well known to those involved in the TB program throughout West Java. According to the expert engaged in this project, the Director of the Provincial Institute of Health, the responsible person of the recipient country in this project, received an award from the President for the project output.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which the noteworthy output was extracted: Tuberculosis Control Project Cooperation period: October 2008-October 2011
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	As in this project, it is desirable to first develop the noteworthy output in the model area, etc.; that is, “Standard Operating Procedures (SOP) for EQA with the Lot Quality Assurance System (LQAS),” and expand them widely throughout the country.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	Since the noteworthy output is relatively unaffected by the facilities and environment of the recipient country, it can be said that it is highly universal and can be applied to other countries. However, even if the noteworthy output such as those in this case are institutionalized and disseminated, the effect will be small without technology, which will be the basis of monitoring and supervision. For that purpose, training and human resource development are also necessary.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	• Link: (Ex-post evaluation) “ <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2014_0600264_4_f.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2014_0600264_4_f.pdf</a> ”

2) Project Outline

<b>Case (project) name</b>	
(Technical cooperation project) Tuberculosis Control Project	
<b>Background of case implementation</b>	
<p>The estimated number of tuberculosis patients in Indonesia was the third highest in the world according to the World Health Organization (WHO) report (2006). With the introduction of DOTS (Direct Observed Treatment Short-course) in the early 1990s, the rate of population in Indonesia to which DOTS is available reached 100% in 2007. However, there were still challenges in providing high quality DOTS. In other words, with the rapid expansion of DOTS, it was recognized that there were problems in the examination/diagnosis system for tuberculosis patients. To solve the problems, the examination accuracy of the laboratories needed to be improved. The Indonesian government has formulated a concept of a laboratory network consisting of the following four stages: regional laboratories, provincial laboratories, intermediate laboratories, and health center laboratories. It requested the Japanese government to support the network.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	<p>Overall Goal: Quality National Tuberculosis Program (NTP) is sustainably managed.</p> <p>Project Purpose: Quality laboratory service for TB is assured through strengthening of laboratory network at the Project site for nationwide expansion.</p>
Outputs	<ol style="list-style-type: none"> <li>1. National TB Reference Laboratory on Human Resource Development (the National Training Center of TB Microscopy Laboratories) is established at the Department of Microbiology, School of Medicine Airlangga University/Dr. Soetomo Hospital Surabaya.</li> <li>2. Regional TB Reference Laboratory (RRL) functions well as a model of functional quality assurance and training laboratory network in Project site (West Java Province).</li> <li>3. Quality Assurance, Recording and Reporting amongst the diagnostic centers and District Health Department including intermediate laboratories is strengthened as a model of functional laboratory network in the Project site (West Java Province).</li> </ol>
Activities	<ul style="list-style-type: none"> <li>- Project site (location): East Java (Airlangga University/Sutomo Hospital - base of nationwide activities listed below), West Java (model province)</li> <li>- Activities:</li> </ul> <p><b>(Nationwide)</b></p> <ul style="list-style-type: none"> <li>- Build a cascade training system to train personnel at each level (core group, master trainer, tuberculosis officers, laboratory technicians).</li> <li>- Develop a training curriculum and teaching materials.</li> </ul> <p><b>(West Java)</b></p> <ul style="list-style-type: none"> <li>- Develop Standard Operating Procedures (SOP) for External Quality Assurance (EQA) with the Lot Quality Assurance System (LQAS).</li> <li>- Implement training on EQA for laboratory technicians and tuberculosis officers.</li> <li>- The project introduces EQA in provincial tuberculosis reference laboratories, intermediate laboratories, and health center laboratories within the province.</li> <li>- Technical guidance is provided to health center laboratories, intermediate laboratories, and provincial laboratories through supervision and regular meetings on quality control, records, and reports related to smear inspection*.</li> </ul> <p>*It is an examination in which sputum is collected and checked whether morbid component is included by microscope.</p>
Implementation period	October 2008 - October 2011
Implementing agencies (Recipient country side)	NTP (National TB Program), Department of Environment and Health, Ministry of Health; Airlangga University/Sutomo Hospital; West Java Health Department
Direct beneficiary	Healthcare workers (laboratory technicians, tuberculosis officers, etc.)
Cooperating Japanese agency	Japan Anti-Tuberculosis Association

Participating Japanese experts	6
<b>Case evaluation results (summary)</b>	
<p>“The project showed the effects as planned. This is because the number and percentage of diagnostic centers that implement the new EQA increased at the time of project completion, and the situation persisted even after the completion of the project. As for the Overall Goal, the new EQA is expanding nationwide, and the indicators show that tuberculosis testing is being carried out well. As for sustainability, there are systematic and financial issues such as personnel shortages and budget shortages, but there are no policy or technical issues. As for efficiency, the amount of cooperation exceeded that planned. From the above, it is judged comprehensively that this project is highly evaluated.” (Excerpt from “Comprehensive evaluation” of ex-post evaluation)</p>	
<b>Major noteworthy output produced in this case</b>	
SOP (standard operating procedure) with LQAS (lot quality assurance system) including monitoring/supervision	
<b>The process by which the noteworthy output concerned was produced</b>	
In 2-1. of the activity items pertaining to “Output 2. Regional TB Reference Laboratory (RRL) functions properly as a model of quality control and training lab network in West Java” of this project, SOP for using the LQAS including monitoring/supervision were developed based on the existing system.	
<b>Process by which the noteworthy output was used</b>	
West Java RRL and all the intermediate laboratories in West Java introduced SOP-based EQA. As a result, the EQA coverage rate reached 100% (26/26) at the provincial level, 100% (24/24) at the intermediate laboratories, and 93% (471/508) at the health centers (according to the terminal evaluation report).	

### 3) Logic Model



Noteworthy output 3. Implementation model of Chagas disease control (preparation-attack-monitoring phases) in Central America

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Implementation model of Chagas disease <sup>1</sup> control (preparation-attack-monitoring phases) in Central America
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Institutions/policies and organization: Vector insect control for Chagas disease consists of preparation, attack, and monitoring phases, and is generally implemented with the following process in Central American countries: <ul style="list-style-type: none"> <li>• In the preparation phase, in order to identify the area in which to intervene, visit the houses in the area where assassin bugs may live, and grasp the rate of houses in each village where assassin bugs live.</li> <li>• In the attack phase, exterminate assassin bugs by spraying pyrethroid pesticide in the houses of the areas identified in the preparation phase (the area where <i>R. prolixus</i><sup>2</sup> lives and the area where <i>T. dimidiata</i><sup>3</sup> lives with a high rate).</li> <li>• In the monitoring phase, to prevent the regrowth of assassin bugs, conduct community-based monitoring in the areas where the attack phase is completed, and spray pesticide in a part of the areas.</li> </ul>
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Individual expert/Technical Cooperation/JOCV (may be included in Technical Cooperation) Region: Central America Approach to be taken (testing/research/early warning): Early warning Infectious disease: Chagas disease
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Chagas disease is an infectious disease that is prevalent mainly in Latin America. The estimated number of patients with Chagas disease in Latin America is 8-9 million, most of whom are the poor in rural areas where assassin bugs live. (As of 2005, “Current status of vector insect control for Chagas disease in Central America (‘International Health Support Association’ 7 in January 2011)”). Chagas disease has a high probability of recovery if treated with medication in the acute phase. However, after 10 to 20 years have passed without any symptoms after shifting to the chronic phase, symptoms such as organ enlargement may be caused due to protozoan invading visceral cells. Protozoan attached to the heart may decrease cardiac function and result in death. Treatment in the chronic phase has not yet been established. There is no preventive vaccine, and vector insect control is considered to be the most effective measure. Therefore, it is very important to establish a system for controlling Chagas disease, such as the noteworthy output, in order to suppress the spread of the disease.

<sup>1</sup> A zoonotic disease peculiar to Latin America caused by a blood infection of *Trypanosoma cruzi*. The main infection routes include vector insect infection by blood-sucking assassin bugs, blood infection by blood transfusion, and mother-to-child infection (from mother to fetus).

<sup>2</sup> A kind of blood-sucking assassin bug (a kind of stink bug)

<sup>3</sup> A kind of blood-sucking assassin bug

5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	As of 2021, the situation of use of the noteworthy output was not confirmed because of lack of information about each country.
6. Main user	Identify users of the noteworthy output	Persons responsible for Chagas disease control (central), local health office staff members, health volunteers, nurses, etc. in each country
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Local residents (also participants in Chagas disease control)
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Effective Chagas disease control has been implemented in Central American countries, and the Chagas disease prevention system has been enhanced.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The Chagas disease control project, which uses the noteworthy output, seems to be well known in the countries where the project is implemented. Specific examples are as follows. <ul style="list-style-type: none"> <li>• In El Salvador, the method for preventing Chagas disease appeared in the textbook “Science, Health and Environment” for sixth graders due to the contribution of the project.</li> <li>• Moreover, in El Salvador, the state-owned education and culture television station introduced Japan's support for Chagas disease control (around 2003).</li> <li>• The Honduras government has decided to formalize July 9, 2010, as “Chagas Disease Day,” and planned a campaign advertising to be rolled out nationwide on the Chagas Disease Day. It was the subject of interviews and reporting by the national television, radio, and newspapers.</li> </ul>
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which the noteworthy output was extracted: A series of cooperation activities for Chagas disease control in Central America (For details, refer to “2) Project outline” below)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	After its success in Guatemala, Chagas disease control was put in place as the noteworthy output and used in the planning and implementation of Technical Cooperation in Central American countries. It is possible to use the noteworthy output in countries where this kind of program was not introduced yet, if there is appropriate adjustment and trial according to the situation of such countries.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	This model was introduced sequentially in Latin American countries with high commonality. However, since the national situation varies, it is not simple enough to be applied without any change. This project was planned based on the experience in the preceding project in Guatemala, a neighboring country. However, since there were differences in preconditions such as the implementation system (number of engineers) between Honduras and Guatemala, the project was adjusted according to the situation in Honduras after it was

		started. These projects did not conduct the preliminary survey that is normally conducted prior to the implementation of Phase 1. However, it was shown in the ex-post evaluation report as a lesson that the preliminary survey should have been conducted on basic information such as the implementation system.
13.Presentation of specific content	Add a link to the actual study reports/evaluation reports	<ul style="list-style-type: none"> <li>•Project for the Control of Chagas Disease (Guatemala): Terminal evaluation report,</li> <li>•Chagas Disease Control Project (Honduras): Terminal evaluation report,</li> <li>•Chagas Disease Control Project Phase2 (Honduras): Ex-post evaluation report</li> <li>•Strengthening of Activities of Survey and Control for Chagas Disease (Nicaragua): Ex-post evaluation, etc.</li> </ul> <p>All the reports and evaluations above can be searched on JICA's "Project Evaluation Search." The link is <a href="https://www2.jica.go.jp/ja/evaluation/index.php">https://www2.jica.go.jp/ja/evaluation/index.php</a></p>



2) Project Outline

(1) Overview of the Chagas Disease Control Program in Central America: JICA implemented “Research project for the prevention of tropical diseases” in Guatemala from 1991 to 1998. After that, for two years from 2000, JICA carried out Chagas disease control in Guatemala by combining individual experts, Japan Overseas Cooperation Volunteers, and provision of medical machinery and equipment, and from 2002, it implemented a technical cooperation project “Technical Cooperation Project for Chagas Disease Vector Control.” Through the implementation of these projects, JICA has established a method for exterminating the vector insect of Chagas disease, one of the “neglected tropical diseases”<sup>4</sup> defined by WHO. In 2003, a technical cooperation project “Chagas Disease Control Project” was started in neighboring countries in Central America. In collaboration with the Pan American Health Organization (PAHO), the project contributed to vector insect control through intervention in Central American regions as well as communities. (The details are as follows.) As shown in the table in (2), Chagas disease control has been visibly effective in each country. “The Project for Integrated Research and Development towards Chagas Disease Control” (SATREPS) is currently underway in El Salvador (started in July 2018 and to be completed in June 2023).

(2) History of the development of the Chagas Disease Control Program in Central America

Period	Country	Scheme	Name	Project Purpose and degree of achievement	Overall Goal and degree of achievement
• Understanding the distribution map of the vector insect (assassin bug) throughout Guatemala					
1991-1998	Guatemala	Research project	Research project for the prevention of tropical diseases (unofficial translation of Japanese project name)	Cannot be confirmed in reports and other materials (search results on evaluation reports on the JICA website and on the JICA library portal site). The main achievements of this project are more than 20 research papers, one of which is “Distribution map of assassin bug throughout Guatemala.” (Source: “The Road to Overcoming the Unknown Endemic ‘Chagas Disease’ in Central America” (hereinafter “ <b>Reference Book</b> ”))	Unknown
• Establishment of a method for exterminating the vector insect					
2000-2002	Guatemala	Individual expert	Plan for Chagas Disease Vector Control (unofficial translation of Japanese project name)	Cannot be confirmed in reports and other materials (search results on evaluation reports on the JICA website and on the JICA library portal site). The main activities of this project are “Baseline survey to identify the habitat area of assassin bugs” and	Unknown
		JOCV (Infectious disease control)			
		Provision of medical machinery and equipment			

<sup>4</sup> Parasitic and bacterial infectious diseases that are widespread mainly in the tropics and among the poor. Since these diseases are rarely developed in developed countries, diagnostics, treatments, and countermeasures have not been developed, and international support is necessary.

				<p>“Assassin bug extermination activity (including technical guidance).” JOCVs in both the fields of health and education also contributed to health education and the creation of teaching materials for health education. The outputs of the activities were reported at the Conference of IPCA (Chagas Control Initiative in Central America) in 2001, and the Honduras government, which witnessed the success of the project, initiated contact with JICA. (Source: Reference Book)</p>	
<p>• Area development through Technical Cooperation</p>					
2002-2005	Guatemala	Technical cooperation project (including JOCV)	Technical Cooperation Project for Chagas Disease Vector Control	<p>“The Technical Cooperation Project for Chagas Disease Vector Control” (Guatemala model) that can be disseminated in Central America is demonstrated and established.</p> <p>Degree of achievement: This project played an important role in achieving the Project Purpose (Source: terminal evaluation).</p>	<p>“By 2010, the spread of Chagas disease is suspended in Central America.”</p> <p>Degree of achievement: In November 2008, Guatemala received international accreditation from PAHO that “the spread of Chagas disease through Rp species has been suspended.” (Source: Reference Book)</p>
<p>• Expansion in neighboring countries</p>					
2003-2009	PAHO	Individual expert (Assigned in each country from 2009)	Advisor on Chagas Disease Control	<p>As coordinators with PAHO and Central American countries, the experts constantly visited Central American countries and provided technical guidance.</p>	
2003-2007 (Phase 1), 2008-2011 (Phase 2)	Honduras	Technical cooperation project (Including JOCV)	Chagas Disease Control Project Phase 1 and 2	<p>(Phase 1) “In the four project target provinces, the spread of Chagas disease through the vector insect is suspended.”</p> <p>Degree of achievement: Of the four target indicators, one indicator was generally achieved, and three indicators were not achieved (Source: ex-post evaluation).</p> <p>(Phase 2) “In the target provinces, the area subject to the attack phase is expanded and a community-based epidemiological monitoring system is established.”</p> <p>Degree of achievement: The five target indicators were generally achieved. (Source: ex-post evaluation)</p>	<p>(Phase 1) “1. By the end of 2010, the spread of Chagas disease is suspended in Honduras. 2. By the end of 2010, the spread of Chagas disease is suspended in Central America.”</p> <p>Degree of achievement: 1. was not achieved, and 2. was generally achieved (Source: ex-post evaluation).</p> <p>(Phase 2) “The spread of Chagas disease through the vector insect is greatly decreased in Honduras.”</p> <p>Degree of achievement: All three target indicators were achieved. (Source: ex-post evaluation)</p>

<p>2003-2007 (Phase 1), 2008-2011 (Phase 2)</p>	<p>El Salvador</p>	<p>Technical cooperation project (Including JOCV)</p>	<p>Chagas Disease Control Project Phase 1 and 2</p>	<p>(Phase 1) “By September 2007, the spread of Chagas disease through the vector insect is decreased in the three western provinces of El Salvador (Santa Ana, Ahuachapan, and Sonsonate).” Degree of achievement: As an indicator of the Project Purpose, the habitat rate (less than 5% in the pilot areas where the vector insect monitoring system has been established) is set. The habitat rate decreased to less than 5% in four of the five pilot areas, and in the remaining one area, pesticide spraying was completed and the habitat rate survey is underway. Therefore, it is highly probable that the Project Purpose will be achieved by the project termination. (Source: terminal evaluation)</p> <p>(Phase 2) “In the target provinces, the area subject to the attack phase is expanded and a community-based Chagas disease monitoring system is established in the maintenance phase.” Degree of achievement: The Project Purpose was generally achieved. The Project Purpose for the introduction of the monitoring system was first achieved in six cities of three provinces and finally achieved in 110 cities of seven target provinces in total (indicator 1). Especially in the three western provinces in the maintenance phase, all cities participated in the monitoring system. In addition, the capture and notification of assassin bugs (indicator 2) was completely dealt with by the Ministry of Health. Regarding the decrease in seroprevalence* under the age of 16 (to be an indicator of spread suspension) (indicator 3), the rate was 1.1% in 2008, but evaluation could not be made since the results of the survey in 2010 were under analysis (Source: terminal</p>	<p>(Phase 1) “1. By the end of 2010, the spread of Chagas disease is suspended in Central America and El Salvador.” Degree of achievement: The Ministry of Health and Welfare of El Salvador is working diligently to achieve the Overall Goal, but it is unlikely that the Overall Goal will be achieved by the end of 2010. The Overall Goal is set by the Chagas Control Initiative in Central America (IPCA), but PAHO/WHO consider it difficult to achieve. PAHO/WHO are shifting their points of view to the new goal of Chagas Control Initiative after 2010. (Source: terminal evaluation)</p> <p>(Phase 2) “In El Salvador, the spread of Chagas disease through T.d. (scientific name of the native species of assassin bug) is greatly decreased.” Degree of achievement: It is difficult to predict whether El Salvador will be able to achieve the Overall Goal within three to five years after the completion of the project, based on the current data on the target provinces. However, in the project, the knowledge and lessons learned in the target provinces were shared with other provinces, through the semi-annual evaluation meeting, the implementation of the training on Chagas disease control for supervisors of health promotion staff of 17 SIBASIs (provincial health organizations) throughout the country, and the distribution of educational materials. (Source: terminal evaluation)</p>
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				evaluation). *Seroprevalence: Shows the rate of positive results by performing a serological test that examines the presence and amount of antibodies against a specific antigen.	
2009-2014	Nicaragua	Technical cooperation project	Strengthening of Activities of Survey and Control for Chagas Disease	<p>“Spread of Chagas disease through the vector insect is continuously controlled in the target provinces.”</p> <p>Degree of achievement: The Project Purpose was achieved by the project completion. In the project target cities, the rate of houses where Td species 3 (native species) lives is maintained at 5% or less (indicator 1), and the number of villages where Rp species 3 (exotic species) lives is zero (indicator 2). (Source: ex-post evaluation)</p>	<p>“Spread of Chagas disease through the vector insect is suspended in the target provinces.”</p> <p>Degree of achievement: The Overall Goal was partly achieved at the time of ex-post evaluation. Since the rate of houses where Td species lives doubled in Esteli from 2013 to 2014, it cannot be denied that the rate may double in the project target provinces after 2017. So it is impossible to examine the rate of houses where Td species lives in the project target provinces in 2019 (indicator 2). (Source: ex-post evaluation)</p>
		JOCV (Infectious disease control)	Cooperation with the above		

Noteworthy output 4. Production and sales system of locally produced, inexpensive and high-quality alcohol hand sanitizer

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	<p>Production and sales system of locally produced inexpensive and high-quality alcohol hand sanitizer (JICA preparatory survey on BoP business, including subsequent business development)</p> <p>(Usually, noteworthy outputs are "those developed during a project"; however, since this case was not a project that included up to the implementation stage but rather a survey that examined the feasibility, the examination was made by including the business development after the completion of the survey in the noteworthy output.)</p>
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Institutions/Policies
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	<p>Scheme: Public-private partnership project            Region: Africa            Approach to be taken (testing/research/early warning): Early warning            Infectious diseases: Infectious diseases due to finger infection</p>
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	It is a business system that improves the medical and hygiene standards of the public hospitals in the region that is used or must be used mainly by the BoPlayer and those who do not have any other option of medical access, and prevents nosocomial infectious diseases. At the start of the preparatory survey on the project, many cases of nosocomial infections were reported. It is thus important to prevent such nosocomial infections with this system.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use after the end of the project	When the public procurement order was received in 2017, the budget of the Ministry of Health was limited, and it was not enough to introduce hand hygiene agents in every setting of many public hospitals. However, owing to the outbreak of Ebola hemorrhagic fever in the Democratic Republic of the Congo in 2018–19 and the outbreak of COVID-19 from 2020, procurement has been made widely not only for medical institutions but also for ministries and agencies, international agencies, and international NGOs under the emergency budget for disaster countermeasures and the additional support budget from overseas. Accordingly, Saraya also provided products responding to such procurement. In addition, sales of hand sanitizer have started for offices, factories, and homes (= practice of production and sales system).

6. Main user	Identify users of the noteworthy output	Saraya Co., Ltd.
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Healthcare providers, caregivers, patients, pregnant women, newborns
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Indicators of nosocomial infections, such as the number of cases of sepsis after cesarean section and the number of cases of diarrhea in the pediatric ward, could not be confirmed with sufficient evidence within the survey period of the scheme for public private partnership project, but disinfection of hands came to be engaged by healthcare providers, patients, and families. A survey conducted independently by Saraya at other hospitals after the completion of the public-private partnership project confirmed a statistical difference in the reduction of nosocomial infections in pediatrics, and it can be said that the project contributed to the reduction of nosocomial infections.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	<ul style="list-style-type: none"> <li>• In February 2013, the East Africa Infection Control Conference was held in Uganda and Saraya's efforts were reported.</li> <li>• According to a book titled "<i>Jonetsu no Africa Tairiku</i>" (African Continent of Passion), some hospitals have come to call alcohol disinfection "SARAYA," and it can be assumed that the hand sanitizer is highly recognized among healthcare professionals in Uganda.</li> </ul>
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	<ul style="list-style-type: none"> <li>• Project name from which noteworthy output was identified: Preparatory Survey on BoP Business on Infectious Disease Prevention with New Alcohol Hand Sanitizer</li> <li>• Cooperation period: January 2012–December 2013</li> <li>• Related projects: Japan Overseas Cooperation Volunteers (collaboration with the 5S project by Japan Overseas Cooperation Volunteers who were assigned to model hospitals, and cooperation by the volunteers for questionnaire collection and qualitative research) and training in Japan to local counterparts</li> <li>• Others: After the project was completed, a hygiene instructor from Saraya Co., Ltd. was invited to participate in infectious disease training co-sponsored by the JICA Uganda Office and the Ministry of Health.</li> </ul>
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	This noteworthy output is useful as a model when planning a new business of rolling out medical consumables and infection prevention products in developing countries.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	Although it is a matter to keep in mind when producing a noteworthy output, the outline of business development described in the logic model is the one after setting Uganda as the target country. Thus, when applying it to other countries, it is necessary to consider individual circumstances.

13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>Links:  (JICA (2014). Preparatory survey on BoP business on infectious disease prevention with new alcohol hand sanitizer in Uganda, Final Report)  “<a href="https://openjicareport.jica.go.jp/928/928_418.html">https://openjicareport.jica.go.jp/928/928_418.html</a>”  (Ministry of Health, Labour and Welfare (2021). "Survey Report on International public procurement in FY2020")  “<a href="https://www.mhlw.go.jp/content/000778753.pdf">https://www.mhlw.go.jp/content/000778753.pdf</a>”</p>
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2) Project outline

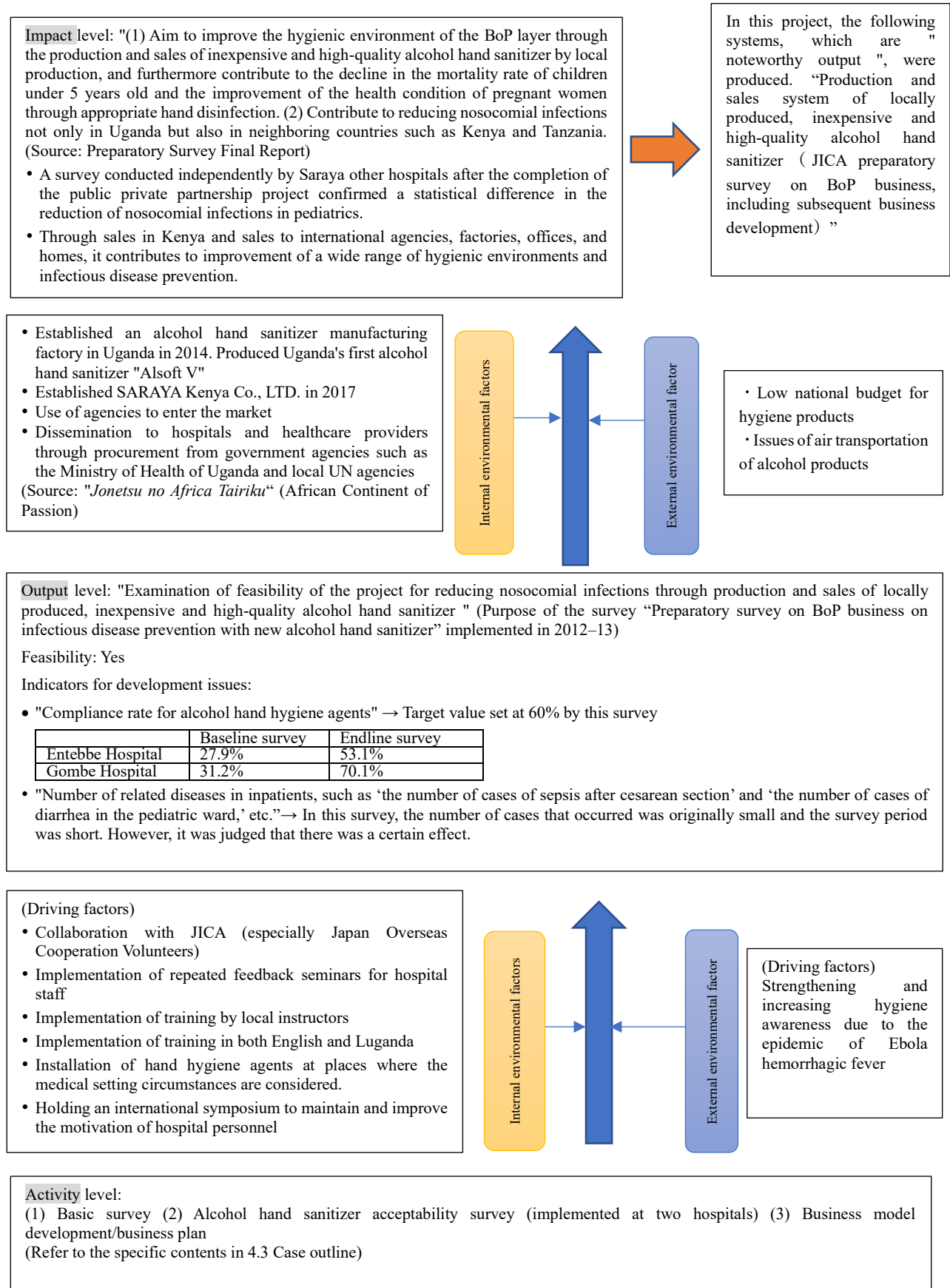
<b>Case (project) name</b>	
(Public-private partnership) Preparatory Survey on BoP Business on Infectious Disease Prevention with New Alcohol Hand Sanitizer (Note: Since 2014, Saraya Co., Ltd. has developed the business independently after the completion of the preparatory survey on the business.)	
<b>Background of case implementation</b>	
<p>As it is said that 75% of the diseases that cause the death of children can be prevented by a proper hygiene environment, it has been pointed out that many cases of death are caused by insufficient improvement on the health and medical environment.</p> <p>In addition, since healthcare professionals are not fully aware of the importance of infectious disease control, and the hygiene conditions of medical devices are poor, there have been many cases where many people including infants and toddlers are affected by unnecessary nosocomial infections, and many cases of death apparently caused by nosocomial infections have been reported.</p> <p>Based on such a background, in the preparatory survey, the feasibility was examined concerning the implementation of the project aimed at the improvement of nosocomial infections through the production and sales of inexpensive and high-quality alcohol hand sanitizer by local production, and furthermore contribution to the decline in the mortality rate of children under 5 years old and improvement of the health condition of pregnant women through appropriate hand disinfection. In addition, following the completion of the survey, business development is still being implemented mainly in Uganda and Kenya as of 2021 based on the business development plan obtained in the survey.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	<p>&lt; Purpose of the preparatory survey on the project (2012–13) &gt;</p> <p>"Examination of feasibility of project for reducing nosocomial infections through production and sales of inexpensive and high-quality alcohol hand sanitizer by local production"</p> <p>&lt; Purpose of business development (2014–) after the completion of the preparatory survey on the project &gt;</p> <p>"(1) Aim to improve the hygienic environment of the BoP layer through the production and sales of inexpensive and high-quality alcohol hand sanitizer by local production, and furthermore contribute to the decline in the mortality rate of children under 5 years old and the improvement of the health condition of pregnant women through appropriate hand disinfection. (2) Contribute to reducing nosocomial infections not only in Uganda but also in neighboring countries such as Kenya and Tanzania. "</p>
Outputs	—
Activities	<ol style="list-style-type: none"> <li>1. From 2010, in cooperation with the Japan Committee for UNICEF, "The Wash a Million Hands Project" was launched in Uganda to spread handwashing that protects the lives of children. Supporting UNICEF handwashing activities launched in Uganda, local handwashing facilities were constructed and campaign activities to educate children and mothers were conducted. At the same time, "The Wash a Million Hands Project" was launched in the Japanese market in cooperation with the Japan Committee for UNICEF. The funds obtained from this campaign were donated to the "Uganda National Hand Washing Campaign" developed by UNICEF, which contributes to the improvement of local handwashing facilities and education and enlightenment of local communities.</li> <li>2. In 2011, the local subsidiary Saraya East Africa Co., Ltd. (currently Saraya Manufacturing Uganda Ltd.) was established and "The 100% Hospital Hand Hygiene Project" was launched.</li> <li>3. In 2012–13, "Preparatory Survey on BoP Business on Infectious Disease Prevention with New Alcohol Hand Sanitizer", a project commissioned by JICA, was implemented at two model hospitals. A survey was conducted on acceptability of products and the feasibility of the project.</li> <li>4. In 2014, a local manufacturing factory was established. Uganda's first alcohol hand sanitizer "Alsoft V" was produced.</li> <li>5. It is being disseminated to hospitals and healthcare professionals through procurement from government agencies such as the Ministry of Health of</li> </ol>



	<p>Uganda and local UN agencies such as the local UNICEF (UN Children's Fund). In 2017, the base was expanded to Kenya to proceed with expansion to East African Community (EAC) countries (Uganda, Kenya, and South Sudan). In addition, the products are also exported to the DRC (Democratic Republic of the Congo).</p> <p>(Source: Survey Report on International public procurement in FY2020)</p>														
Mechanism of project	<p>With the desire to support the dissemination and enlightenment activities of "handwashing" in developing countries, Uganda was selected among from the three countries proposed by the Japan Committee for UNICEF from the perspective of language, safety, economic development, etc. While providing support for handwashing equipment and hygiene education at schools by local UNICEF and conducting on-site inspection visits, the possibility of the project for spreading alcohol hand hygiene agents in hospitals was examined. This is the beginning of this project.</p> <p>Using JICA's scheme, a survey was conducted at two model hospitals, which were introduced by JICA, on the extent to which alcohol hand hygiene agents that have not been used locally are accepted, how large the market is, and whether local production is possible. Then, verification was made on the feasibility of the system of selling alcohol hand hygiene agents to public hospitals in Uganda.</p> <p>Subsequently, a factory for manufacturing alcohol hand hygiene agents was built in Uganda. Aiming to expand them to public hospitals in Uganda, a B to G business started through participation in public bidding and sales activities to receive orders. Since then, procurement has also been made to local UN agencies. A local subsidiary has been established in Kenya, and expansion of the business is planned in the future, taking the East African market as a whole into consideration. Owing to the outbreak of Ebola hemorrhagic fever in the Democratic Republic of the Congo in 2018–19 and the outbreak of COVID-19 from 2020, sales have started not only for medical institutions and UN agencies but also for international NGOs, offices, factories, and homes.</p>														
Implementation period	<p>2010: Campaign activities to build local handwashing facilities and educate children and mothers in cooperation with the Japan Committee for UNICEF  January 2012–December 2013: JICA preparatory survey on BoP business  2014–: Expansion to hospitals in Uganda, other countries, and the United Nations</p>														
Implementing agencies (Recipient country side)	<p>The project participants and stakeholders at the time of implementing the JICA preparatory survey on BoP business are as follows.</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Name</th> <th>Role</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Implementing agency</td> <td>Saraya Co., Ltd.</td> <td>Supervision of overall activities and implementation of survey</td> </tr> <tr> <td>Mitsubishi UFJ Research and Consulting Co., Ltd.</td> <td>Implementation of survey</td> </tr> <tr> <td>Local partner</td> <td>Two medical institutions (Entebbe District Hospital, Gomba District Hospital)</td> <td>Model hospitals</td> </tr> <tr> <td>Stakeholders</td> <td colspan="2">Government agencies such as the Ministry of Health of Uganda, UNICEF Uganda Office, JICA Uganda Office, NGOs, sugar factories (local companies), Japan Overseas Cooperation Volunteers</td> </tr> </tbody> </table>	Category	Name	Role	Implementing agency	Saraya Co., Ltd.	Supervision of overall activities and implementation of survey	Mitsubishi UFJ Research and Consulting Co., Ltd.	Implementation of survey	Local partner	Two medical institutions (Entebbe District Hospital, Gomba District Hospital)	Model hospitals	Stakeholders	Government agencies such as the Ministry of Health of Uganda, UNICEF Uganda Office, JICA Uganda Office, NGOs, sugar factories (local companies), Japan Overseas Cooperation Volunteers	
Category	Name	Role													
Implementing agency	Saraya Co., Ltd.	Supervision of overall activities and implementation of survey													
	Mitsubishi UFJ Research and Consulting Co., Ltd.	Implementation of survey													
Local partner	Two medical institutions (Entebbe District Hospital, Gomba District Hospital)	Model hospitals													
Stakeholders	Government agencies such as the Ministry of Health of Uganda, UNICEF Uganda Office, JICA Uganda Office, NGOs, sugar factories (local companies), Japan Overseas Cooperation Volunteers														
Direct beneficiary	healthcare providers, caregivers, patients, pregnant women, newborns														
Cooperating Japanese agency	—														
Participating Japanese experts	—														
<b>Case evaluation results (summary)</b>															
<p>The achievement level of the project up to the project purpose level is high. Regarding the realization level of higher-level goals, the achievement level seems to be high, as efforts are being made to expand to other countries.</p>															

<b>Major noteworthy output produced in this case</b>
Production and sales system of locally produced, inexpensive and high-quality alcohol hand sanitizer (JICA preparatory survey, and subsequent business development included)
<b>The process by which the noteworthy output concerned was produced</b>
The specific contents are as described in the above Case outline, "Activities."
<b>Process by which the noteworthy output was used</b>
The production and sales system of alcohol hand sanitizer was verified in this public private partnership project. As a result, Saraya Co., Ltd. established a local manufacturing factory after the project and started production of Uganda's first alcohol hand sanitizer "Alsoft V," which is being disseminated to hospitals and healthcare providers.

### 3) Logic Model



(Supplementary explanation)

The above logic model was created by the evaluator based on the report. Based on the survey “Preparatory survey on BoP business on infectious disease prevention with new alcohol hand sanitizer” in which the feasibility of a project aimed at reducing nosocomial infections through the production and sales of alcohol hand sanitizer was examined, the logic model shows the business development that has been carried out after the survey. Since the purpose of the survey is to examine the feasibility, it does not mean that the target values of specific indicators have been set in advance. In the survey, an examination was also made on the indicators in conducting the project in the future, and some target values were partly set eventually. Saraya Co., Ltd. has been expanding its business significantly after the preparatory survey on the project, and the logic model was created based on those activities.

Noteworthy output 5. Comprehensive research and training capability for infectious disease control at Noguchi Memorial Institute for Medical Research (NMIMR)

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Comprehensive research and training capability for infectious disease control at Noguchi Memorial Institute for Medical Research (NMIMR) (Note: It refers to the overall competencies for research and training include knowledge and skills to raise funds, yield reliable outcomes in research activities, plan and implement training programs, coordinate with other organizations, etc.)
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Organization
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Technical cooperation project Region: Africa Approach to be taken (testing/research/early warning): testing and research Infectious diseases: HIV/AIDS, Tuberculosis (TB), sexually transmitted diseases (STDs), schistosomiasis, viral hemorrhagic fever, and measles
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Infectious diseases such as malaria, diarrhea, and respiratory infections are a serious concern in Ghana, and its health sector's primary responsibility is to control those infectious diseases. The enhanced capability for research and training have helped enhance the capacity of the Ministry of Health of Ghana and the Ghana Health Service bureau against infectious diseases prevailing in the country, and improve their policies and activities. In particular, compared with before the Project, the Institute's research competency has improved significantly in the areas of TB, viral hemorrhagic fever, and influenza. The Project strengthened the Institute's collaboration with stakeholders and contributed to the policy-making and implementation process of Ghana's health sector.
5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	Researchers at NMIMR with enhanced capability for research and training have continuously contributed to improving diagnosis and surveillance through research activities and training.
6. Main user	Identify users of the noteworthy output	Ministry of Health of Ghana, and the Ghana Health Service bureau
7. Direct	Identify the beneficiary	People having or suspected of having infectious diseases

beneficiary and population	if user and direct beneficiary are different	
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Compared with the status before the Project, the Institute's research capability has improved significantly in the areas of TB, viral hemorrhagic fever, and influenza. The Project also enabled the Institute to provide training for its staff, contributing to enhancing their skills to diagnose and conduct surveillance on infectious diseases.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The Noguchi Memorial Institute for Medical Research is widely known in and outside Ghana as the country's hub to combat infectious diseases. The Institute is also recognized by universities and research institutes outside Ghana as an international hub for joint research conducted in Ghana and other West African countries.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Name of the project that produced the noteworthy output: Infectious Diseases Project at NMIMR Cooperation period: January 1999–December 2003 Related projects: Medical Research Project at NMIMR (Phase 1 and 2) (1986–97); The Project for Improvement of Noguchi Memorial Institute for Medical Research (the first and second terms) (1998–1999); West African Centre for International Parasite Control Project (January 2004 – December 2008); Studies of Anti-viral and Anti-parasitic Compounds from Selected Ghanaian Medicinal Plants (April 2010 – March 2015); The Project for the Construction of Advanced Research Center for Infectious Diseases at Noguchi Memorial Institute for Medical Research (May 2016 – May 2021)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The enhanced capability at NMIMR which is the base for research and training in the country and the region is used for generating and synthesizing of new knowledge for infectious disease control and contribute to training and reskilling of health care workers.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when	Considerations need to be paid to its rules and systems, financial administration, and workplace conditions for the Institute to retain competent researchers and other staff members over a long period and keep the turnover rates low and the productivity high.

	used.	
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	Ex-post Evaluation Report <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2006_0604630_4_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2006_0604630_4_s.pdf</a>  Terminal Evaluation Report_ <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2003_0604630_3_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2003_0604630_3_s.pdf</a>

## 2) Project outline

<b>Case (project) name</b>	
(Technical cooperation project) Infectious Diseases Project at NMIMR	
<b>Background of case implementation</b>	
Infectious diseases such as malaria, diarrhea, and respiratory infections are a serious concern in Ghana, and its health sector's primary responsibility is to control those infectious diseases. Moreover, as the threat of HIV/AIDS was growing, the number of resultant opportunistic infections with TB, etc., was increasing, adding to the country's list of infectious diseases that needed to be tackled. A technical cooperation project (that preceded the Project) was implemented at the Noguchi Memorial Institute for Medical Research, which was established in 1979 through Japan's grant aid. The technical cooperation project (that preceded the Project) confirmed the necessity of measures against infectious diseases in Ghana, leading to the country's request for another technical cooperation project of Japan concerning research and measures against vaccine-preventable diseases and HIV/AIDS.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	The Noguchi Memorial Institute for Medical Research enhances the capability for research and training to combat infectious diseases in conjunction with other public health institutions.
Outputs	<ol style="list-style-type: none"> <li>1. Clarifying molecular epidemiological characteristics of HIV/AIDS.</li> <li>2. Clarifying epidemiological and pathogenic characteristics of STDs.</li> <li>3. Establishing a laboratory for reference and research on TB at the Institute.</li> <li>4. Clarifying the epidemiology and etiology of vaccine-preventable diseases and other infectious diseases (viral hemorrhagic fever, measles apoptosis, measles surveillance, and schistosomiasis).</li> <li>5. Establishing a biosafety control system at the Institute.</li> <li>6. Developing resources (e.g., experimental animals, mid-career technicians) for research on and measures against infectious diseases.</li> <li>7. Implementing the International Parasite Control Initiative at the Noguchi Memorial Institute for Medical Research.</li> </ol>
Activities	A series of activities related to the aforementioned outputs
Implementation period	January 1999–December 2003
Implementing agencies (Recipient country side)	The Noguchi Memorial Institute for Medical Research
Direct beneficiary	People having or suspected of having infectious diseases
Cooperating Japanese agency	National Institute of Infectious Diseases
Participating Japanese experts	Dispatch of long-term experts (12 people) and short-term experts (24 people)
<b>Case evaluation results (summary)</b>	
The Project Purpose was mostly achieved (Source: Ex-post Evaluation). An unprecedented number of papers were published by the Institute as a result of the Project, although the number and quality of papers varied by the research field. The total amount of research grants obtained by the Institute has continued increasing, and the Institute's research capacity have been strengthened in all aspects. The Institute has also provided training for graduate and university students majoring in medical research and staff of other public health institutions. A training program and its follow-up program on TB, parasites, and STDs conducted by the Institute for laboratory technicians contributed to the improvement of diagnostic skills at the provincial level.	
<b>Major noteworthy output produced in this case</b>	
Comprehensive research and training capability for infectious disease control at Noguchi Memorial Institute for Medical Research (NMIMR)	
<b>The process by which the noteworthy output concerned was produced</b>	
Activities related to each of the outputs described on the PDM.	
<b>Process by which the noteworthy output was used</b>	
The Institute's heightened capability for research and training helped enhance or improve measures taken by the Ministry of Health of Ghana and the Ghana Health Service bureau against infectious diseases prevailing in Ghana. In particular, compared with before the Project, the Institute's research competency has improved significantly in the areas of TB, viral hemorrhagic fever, and influenza. The Project strengthened the Institute's collaboration with stakeholders and contributed to the policy-making and measure implementation process of Ghana's health sector.	

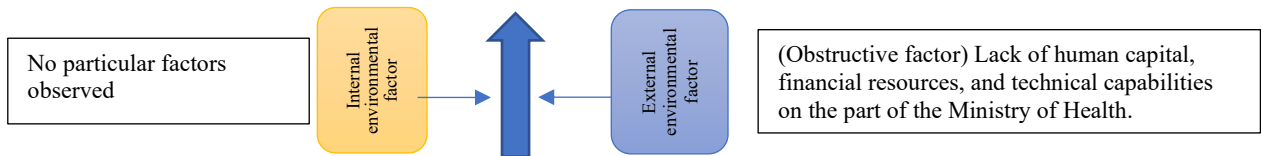


### 3) Logic model

**Overall Goal (Impact):** Implementation of the Project's recommendations by 2004.

Degree of achievement: **Unknown** (Source: Ex-post Evaluation)

It was found impossible to assess the degree of achievements exactly without documentation of the number of and information about recommendations made through the Project and which of them were adopted as part of the health policies in Ghana. However, some interviews and communications or discussions at workshops indicate that the Institute has worked together with Ghana's Ministry of Health and the Ghana Health Service bureau and that such collaboration has influenced the activities of those three parties. Even so, there has been no relationship between the two or three parties that are legally or institutionally defined, and it seems that the Institute and the other two have worked together on an as-needed basis probably for technical and financial reasons.



**Project Purpose (Outcome):** Enhancing the capability of the Noguchi Memorial Institute for Medical Research to conduct research on infectious diseases hand-in-hand with other public health institutions, and heightening the Institute's capability to provide its staff members with training on the control of infectious diseases.

Degree of achievement: **Generally achieved** (Source: Terminal Evaluation).

Judging from the number of papers published and the amount of research grants obtained by the Institute, it is safe to conclude that the research competency of the Noguchi Memorial Institute for Medical Research has been heightened overall. The Institute has provided training for graduate and university students majoring in medical research and staff of other public health institutions.

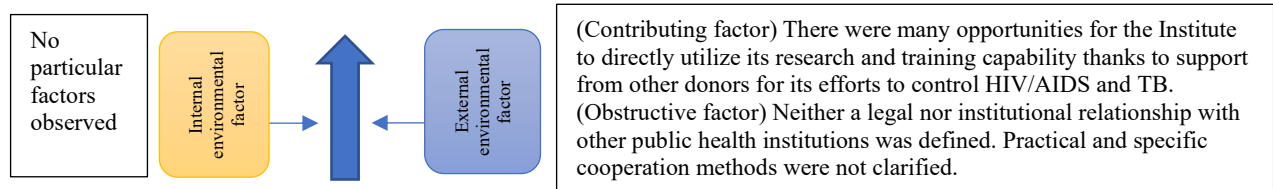
**Sustainability of outcome: The outcome has high sustainability, with some reservations** (Source: Ex-post Evaluation)

- Policy and institutional aspect: As is seen by the fact that Ghana's second five-year health program (2002–2006) places emphasis on the control of HIV/AIDS, STDs, malaria, TB, guinea worm, polio, etc., the Project's target infectious diseases are relevant to the country's health policies.

- Organizational aspect: It deserves recognition that the Institute has allocated dedicated staff for the maintenance and management of its facilities and equipment and that the Institute has made efforts to seek budget appropriations from the government. There is room for improvement in the Institute's reporting system when a problem occurs to any of its equipment or instruments.

- Technical aspect: The skills transferred to the Institute are by and large embedded among its staff members.

- Financial aspect: The Institute is only funded with money for personnel cost by the Ghanaian government. Therefore, the Institute appropriates part of external financial resources (e.g., research funds) to its overhead costs.

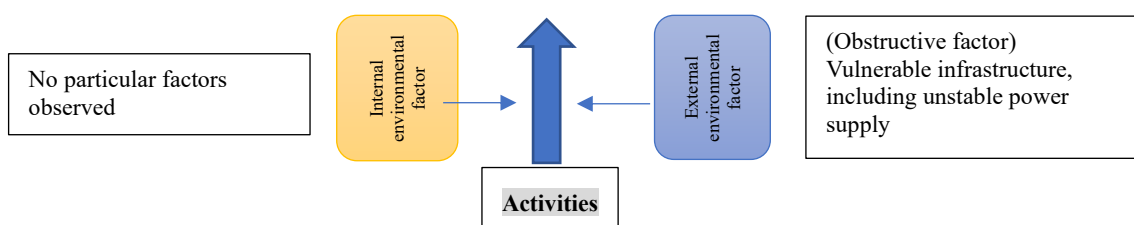


**Output:** Given that the Project Purpose was achieved, it would be safe to assume that the intended Output was achieved, although there was no statement as to the achievement level in either the Ex-post Evaluation or Terminal Evaluation Report.

1) Clarifying molecular epidemiological characteristics of HIV/AIDS. 2) Clarifying epidemiological and pathogenic characteristics of STDs. 3) Establishing a laboratory for reference and research on TB at the Institute. 4) Clarifying the epidemiology and etiology of vaccine-preventable diseases and other infectious diseases (viral hemorrhagic fever, measles apoptosis, measles surveillance, and schistosomiasis). 5) Establishing a biosafety control system at the Institute. 6) Developing resources (e.g., experimental animals, mid-career technicians) for research on and measures against infectious diseases. 7) Implementing the International Parasite Control Initiative at the Noguchi Memorial Institute for Medical Research.



**Noteworthy output: Comprehensive research and training capability for infectious disease control**



Noteworthy output 6. Biosafety level 3 laboratory and its maintenance system established at the University Teaching Hospital, the Ministry of Health, Zambia

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Biosafety level 3 <sup>5</sup> laboratory and its maintenance system established at the University Teaching Hospital, the Ministry of Health, Zambia
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Organization and infrastructure
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: SATREPS (Science and Technology Research Partnership for Sustainable Development) Region: Africa Approach to be taken (testing/research/early warning): Testing Infectious diseases: Tuberculosis and trypanosomiasis <sup>6</sup>
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	<p>According to the World Health Organization, the prevalence of tuberculosis in Zambia is estimated to be 333/100,000 in 2019, the 10th highest in the world. Therefore, tuberculosis is categorized as one of the most important infectious diseases to control in Zambia. On the other hand, trypanosomiasis is positioned as a significant neglected tropical disease by the World Health Organization, and the Zambian government focuses on its control.</p> <p>With the introduction of the Biosafety Level 3 laboratory and the improvement of test equipment, laboratory technicians with a high level of knowledge and skills on drug resistance and culture were secured, the personnel system with full-time regular staff was reinforced, and the test and diagnosis systems for tuberculosis and trypanosomiasis were improved. The Biosafety Level 3 laboratory has been utilized to reduce the risk of laboratory infection in a stream of tuberculosis testing: a mycobacterium tuberculosis culture test, drug susceptibility tests, and DNA extraction. The laboratory is used for culturing of all specimens brought to the tuberculosis laboratory in the University Teaching Hospital, the Ministry of Health, Zambia, to contribute to diagnosis of infectious diseases. It is the largest among the Biosafety Level 3 laboratories introduced in Zambia and is designed for easy maintenance.</p>

<sup>5</sup> Laboratory facilities are classified into Basic Laboratory-Biosafety (BS) Level 1 or BS Level 2, Containment Laboratory-BS Level 3, or Advanced Containment Laboratory-BS Level 4.

<sup>6</sup> This is an infectious disease transmitted by tsetse flies' biting.

5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	The University Teaching Hospital, the Ministry of Health, Zambia, had gotten its own maintenance budget, which was continuously used even five years after the project ended. To manage the Biosafety Level 3 facility, a standard procedure for the use of BSL-3 facilities was prepared, and approved by the Safety Committee of the University Teaching Hospital, the Ministry of Health, Zambia. To enable self-maintenance of the Biosafety Level 3 laboratory, counterpart technicians were trained. It is expected that this facility will continue to be effectively used for disease detection and definitive diagnosis at the time of outbreak of a serious infectious disease.
6. Main user	Identify users of the noteworthy output	Researchers at the University Teaching Hospital, the Ministry of Health, Zambia
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Suspected patients with tuberculosis or trypanosomiasis
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	The Biosafety Level 3 laboratory supported by Japan, which was established at the Faculty of Veterinary Medicine, the University of Zambia had been the only one in Zambia until the new laboratory was established at the University Teaching Hospital. The one in the Faculty of Veterinary Medicine has been operating as a dedicated facility to conduct research mainly into viral infections including Ebola Virus Disease. It is risky to conduct both viral and bacterial experiments in the same facility in terms of safety management. Moreover, in light of the quantity of specimens to process, development of a new Biosafety Level 3 laboratory was requested. The establishment of the new laboratory facility ensured safety of researchers and the surrounding environment in research of dealing with hazardous pathogens including Mycobacterium tuberculosis.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The opening ceremony of the Biosafety Level 3 laboratory in August 2012 was featured in local newspapers, television, and radio. Those involved in the project were interviewed.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation	Name of the project from which the noteworthy output was identified: Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis Cooperation period: November 2009–November 2013

	period up to 2021, not only for the target project but also for the target organizations/institution	Related project: Project for Surveillance of Viral Zoonoses in Africa (June 2013–May 2018)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	In this project, a wide range of support was provided not only for development of the infrastructure of a Biosafety Level 3 laboratory, but also for training of technicians necessary for safe and sustainable maintenance, and preparation of a standard procedure for facility use. It is expected that the laboratory is used to ensure safety of research related to hazardous pathogens, including Mycobacterium tuberculosis.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	(Below is the point to keep in mind when generating the noteworthy output.) In this project, the Japanese principal researcher was involved from the design stage of the Biosafety Level 3 laboratory, and selected materials and equipment that are easy for local researchers to operate and maintain. This specialized knowledge was very useful for laboratory development and maintenance.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>Ex-ante evaluation report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2008_0802834_1_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2008_0802834_1_s.pdf</a></p> <p>Mid-term review reports  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2012_0802834_2_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2012_0802834_2_s.pdf</a>  <a href="https://libopac.jica.go.jp/images/report/12112934.pdf">https://libopac.jica.go.jp/images/report/12112934.pdf</a></p> <p>Terminal evaluation report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2013_0802834_3_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2013_0802834_3_s.pdf</a></p> <p>Ex-post evaluation report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2016_0802834_4_f.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2016_0802834_4_f.pdf</a></p> <p>SATREPS website of Japan Science and Technology Agency  <a href="https://www.jst.go.jp/global/kadai/h2012_zambia.html">https://www.jst.go.jp/global/kadai/h2012_zambia.html</a></p>

2) Project outline

<b>Case (project) name</b>	
(SATREPS) Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis	
<b>Background of case implementation</b>	
<p>For tuberculosis diagnosis, a sputum smear test<sup>7</sup>, which is also promoted in DOTS<sup>8</sup>, a global tuberculosis control intervention, is usually used and is also a principal tuberculosis testing method in Zambia. However, this test has low sensitivity and a high misdiagnosis rate. In addition, a culture test used for tuberculosis that cannot be detected by a sputum smear test is a highly sensitive diagnostic method, but this test takes 4-8 weeks for definitive diagnosis. Therefore, early diagnosis and early treatment are difficult to start. Moreover, since there are many problems caused by the hygienic environment of test facilities in Zambia, such as contamination, it is necessary to develop a new rapid and highly specific diagnostic method. Furthermore, expression of drug-resistant mycobacterium tuberculosis is feared. Although there are reports of multidrug-resistant (MDR) strains<sup>9</sup>, the actual number is not known. For genomic analysis of tuberculosis strains required for MDR diagnosis, simple test kits using a DNA microarray<sup>10</sup> were developed. However, since the unit cost of the test is high and the kits are not practical, it is necessary to develop a convenient and inexpensive diagnostic method that also has high specificity based on the genetic information on tuberculosis strains in Zambia.</p> <p>Trypanosomiasis, a zoonosis, falls under "neglected tropical diseases," which are a field lagging far behind other infectious diseases in diagnostic methods and therapeutic drugs. The number of infected persons in sub-Saharan Africa is estimated to be 50,000-70,000. Although the number of new infection reports in Zambia is 50 or fewer per year, which is smaller than in neighboring countries, many cases have been reported where misdiagnosis as malaria has led to an increase in severity. As with tuberculosis, it is necessary to develop a simple and rapid diagnostic method. In addition, therapeutic drugs currently available are limited. Owing to problems such as side effects, it is necessary to research and develop new drugs with high safety and efficacy.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	The capabilities of research and development of rapid diagnostic methods for tuberculosis and trypanosomiasis, as well as screening of candidate compounds for trypanosomiasis therapeutic drugs at research institutes in Zambia improve through joint research.
Outputs	<ol style="list-style-type: none"> <li>1. Development of a rapid diagnostic method for tuberculosis, including drug susceptibility testing, as a method that can be implemented in laboratories in Zambia.</li> <li>2. Development of a rapid diagnostic method for trypanosomiasis as a method that can be implemented in laboratories in Zambia.</li> <li>3. Development of a nonclinical test candidate compound for trypanosomiasis by using a diversity-oriented synthetic method.</li> <li>4. Development of a research system for rapid diagnostic methods for tuberculosis and trypanosomiasis, as well as screening of candidate compounds for trypanosomiasis therapeutic drugs.</li> </ol>
Activities	Activity groups corresponding to each of the above outputs
Implementation period	November 2009–November 2013
Implementing agencies (Recipient country side)	Ministry of Health, and the University Teaching Hospital and the School of Veterinary Medicine, the University of Zambia
Direct beneficiary	Patients suspected of having tuberculosis or trypanosomiasis
Cooperating	Hokkaido University Research Center for Zoonosis Control, the Faculty of

<sup>7</sup> This is a test in which sputum is collected to be observed under a microscope to determine what kinds of pathogenic bacteria and viruses are contained in it, which is widely conducted for diagnosis of respiratory diseases.

<sup>8</sup> Directly Observed Therapy, Short-course (DOTS) is the name given to the tuberculosis (TB) control strategy recommended by the World Health Organization to identify and treat TB patients.

<sup>9</sup> These denote bacteria against which many antibacterial drugs (antibiotics) have stopped working.

<sup>10</sup> This denotes an analytical instrument in which a large number of DNA fragments are placed at high density on a plastic or glass substrate in order to measure the expression levels of genes in a cell.

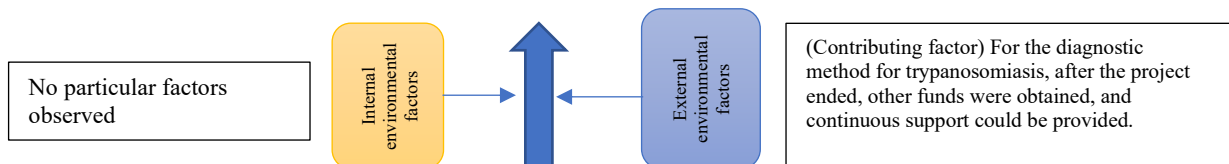
Japanese agency	Medicine of Tottori University, the Faculty of Medical Sciences of Fujita Health University, and the Japan Agency for Medical Research and Development (AMED)
Participating Japanese experts	Dispatch of 2 experts (in development of genetic diagnosis methods for tuberculosis and trypanosomiasis and project coordination for a total of 55 person-months) and short-term experts (in tuberculosis genetic diagnosis, trypanosomiasis genetic diagnosis, etc., for a total of 22.9 person-months)
<b>Case evaluation results (summary)</b>	
The Project Purpose was almost achieved. From the perspectives of human resource development, organizational capacity building, and facility development, the Project Purpose can be considered to be almost achieved at the time of terminal evaluation, for research capabilities other than the search for a compound with anti-trypanosomiasis activity (relevant to Output 3).	
<b>Major noteworthy output produced in this case</b>	
Biosafety level 3 laboratory and its maintenance system established at the University Teaching Hospital, the Ministry of Health, Zambia	
<b>The process by which the noteworthy output concerned was produced</b>	
The output was produced by activities relevant to Output 1 of PDM.	
<b>Process by which the noteworthy output was used</b>	
The Biosafety Level 3 laboratory is utilized to reduce the risk of laboratory infection in a stream of tuberculosis testing: a mycobacterium tuberculosis culture test, drug susceptibility tests, and DNA extraction. It is also used for culturing of all specimens brought to the tuberculosis laboratory in the University Teaching Hospital, the Ministry of Health, Zambia, to contribute to diagnosis of infectious diseases.	

### 3) Logic model

**Overall Goal (Impact):** Although no overall goal was set for this project, "practical use of rapid diagnostic methods for tuberculosis and trypanosomiasis" was recognized as an expected impact at the time of terminal evaluation.

Degree of achievement: **The Overall Goal was partially unachieved** (Source: Ex-post evaluation)

Assuming Point of Care (POC) testing in rural areas with a large number of potential patients, a rapid, accurate, highly operable, and low-cost diagnostic method for tuberculosis was developed. A rapid diagnostic method for trypanosomiasis has already been used for definitive diagnosis of patients suspected of having African sleeping sickness (African trypanosomiasis). However, the rapid diagnostic method for trypanosomiasis is used only in the laboratories of some university hospitals or research institutes, and is not an official method, so the range of beneficiaries is limited. The rapid diagnosis method for tuberculosis was not continuously used after the project ended.



**Project Purpose (Outcome):** "Improvement in the capabilities of research and development of rapid diagnostic methods for tuberculosis and trypanosomiasis, as well as screening of candidate compounds for trypanosomiasis therapeutic drugs at research institutes in Zambia through joint research."

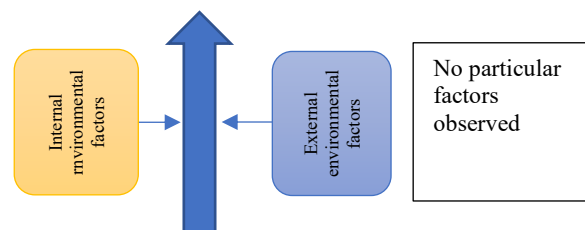
Degree of achievement: **Almost achieved** (Source: Terminal evaluation)

From the perspectives of human resource development, organizational capacity building and facility development, the Project Purpose can be considered to be almost achieved at the time of terminal evaluation, for research capabilities other than the search for a compound with anti-trypanosomiasis activity.

**Sustainability of the outcome:** "The sustainability of the project outcome is rated as moderate" (Source: Ex-post evaluation)

- Policy and institution: Not clarified.
- Organization: The research environment is prepared for improvements of rapid diagnosis.
- Technique: Thanks to the expansion of equipment and trained laboratory technicians, the laboratory functions well to provide cultivation tests.
- Finance: The laboratory functions well to perform its duties and is used and maintained properly. Budget for servicing of safety cabinets has been secured each year.

(Contributing factors) The Japanese principal researcher was involved from the design stage of the Biosafety Level 3 laboratory, and selected materials and equipment that are easy for local researchers to operate and maintain. The development of techniques was also adapted to the financial situation and the technical level of health care workers in the recipient country.



**Outputs: Outputs 1, 2, and 4 were achieved. Output 3 is unachieved.** (Source: Ex-post evaluation)

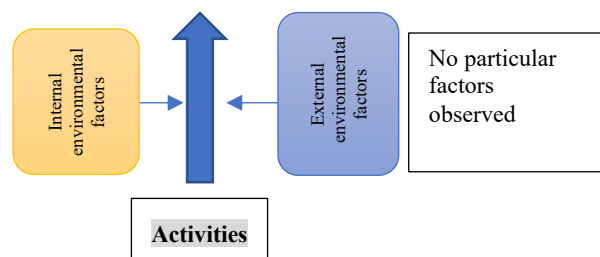
- 1) Development of a rapid diagnostic method for tuberculosis, including drug susceptibility testing, as a method that can be implemented in laboratories in Zambia.
- 2) Development of a rapid diagnostic method for trypanosomiasis as a method that can be implemented in laboratories in Zambia.
- 3) Development of a nonclinical test candidate compound for trypanosomiasis by using a diversity-oriented synthetic method.
- 4) Development of a research system for rapid diagnostic methods for tuberculosis and trypanosomiasis, as well as screening of candidate compounds for trypanosomiasis therapeutic drugs.



**Noteworthy output: Biosafety Level 3 laboratory and its maintenance system established at the University Teaching Hospital**

(Contributing factors) C/P technicians were encouraged to use the laboratory on a daily basis. Through collaborative work, a relationship of trust was built between those involved.

(Obstructive factors) It took a certain time to gain the understanding of those involved in the recipient country about not paying allowances for C/P activities. This project and a project supported by another country scrambled for researchers and specimens.



Noteworthy output 7. A national network of inspection agencies built around the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	<p>A national network of inspection agencies built around the National Institute of Hygiene and Epidemiology (NIHE) in Hanoi</p> <p>(Details) The national network is made up of NIHE and other core national institutes of regional studies of Tay Nguyen Institute of Hygiene and Epidemiology (TIHE), Pasteur Institute of Nha Trang (PINT), and Pasteur Institute of Ho Chi Minh City (PIHCMC), as well as the laboratory staff of Provincial Center for Preventive Medicine (PCPM).</p>
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Organization
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	<p>Scheme: Technical cooperation project</p> <p>Region: Asia</p> <p>Approach to be taken (testing/research/early warning): Testing</p> <p>Infectious disease: Various infectious diseases</p>
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	<p>Vietnam has suffered from a variety of infectious diseases, including severe acute respiratory syndrome (SARS) in 2003, Highly Pathogenic Asian Avian Influenza A (H5N1) in 2004, and pandemic influenza (A (H1N1) pdm09) in 2009. In the Comprehensive Development Design for the Health System in Vietnam to 2010 and Vision by 2020, Vietnam has set prevention of infectious disease epidemics as a priority, and is urgently working to establish an accurate and prompt inspection system in Vietnam. The noteworthy output and the network of inspection agencies are part of the inspection system.</p>
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	<p>Owing to the construction of such a network, training requests (PCPM)/implementation (institutes), requests for support from the institutes for examinations that is difficult to be performed, information exchange, etc. are being actively and reliably performed in accordance with the regulations*</p>



		* For strengthening PCPM capacity, the Ministry of Health/NIHE have created the provisions for continuous capacity building between PCPM and institutes that adopt the "system for continuing post-graduate training." It is specified that the institutes and PCPM have the responsibility and obligation to continue to provide the trainees with the capacity building training for the specified number of credits.
6. Main user	Identify users of the noteworthy output	Staff of inspection agencies with infectious disease
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Same as user
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	At the beginning of the project which produced this noteworthy output, there was not much protocol and information sharing especially in terms of laboratory diagnosis by Good Microbiological Technique (GMT) between NIHE and other core national institutes of regional studies of TIHE, PINT, and PIHCMC, with very little mutual cooperation. However, short-term experts and NIHE staff who received enough training and experience in the previous project (see below item 10) are visiting other core national institutes of regional studies, and repeating training sessions and workshops for the institutes and pilot PCPM. Thereby, technical support and transfer is progressing, and the training participants are having a better understanding of each other, so that a mutual cooperation system is being built (Terminal evaluation).
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	Unknown
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which noteworthy output was identified: Project for Capacity Development for Laboratory Network in Vietnam of Biosafety and Examination of Highly Hazardous Infectious Pathogens Cooperation period: February 2011–February 2016

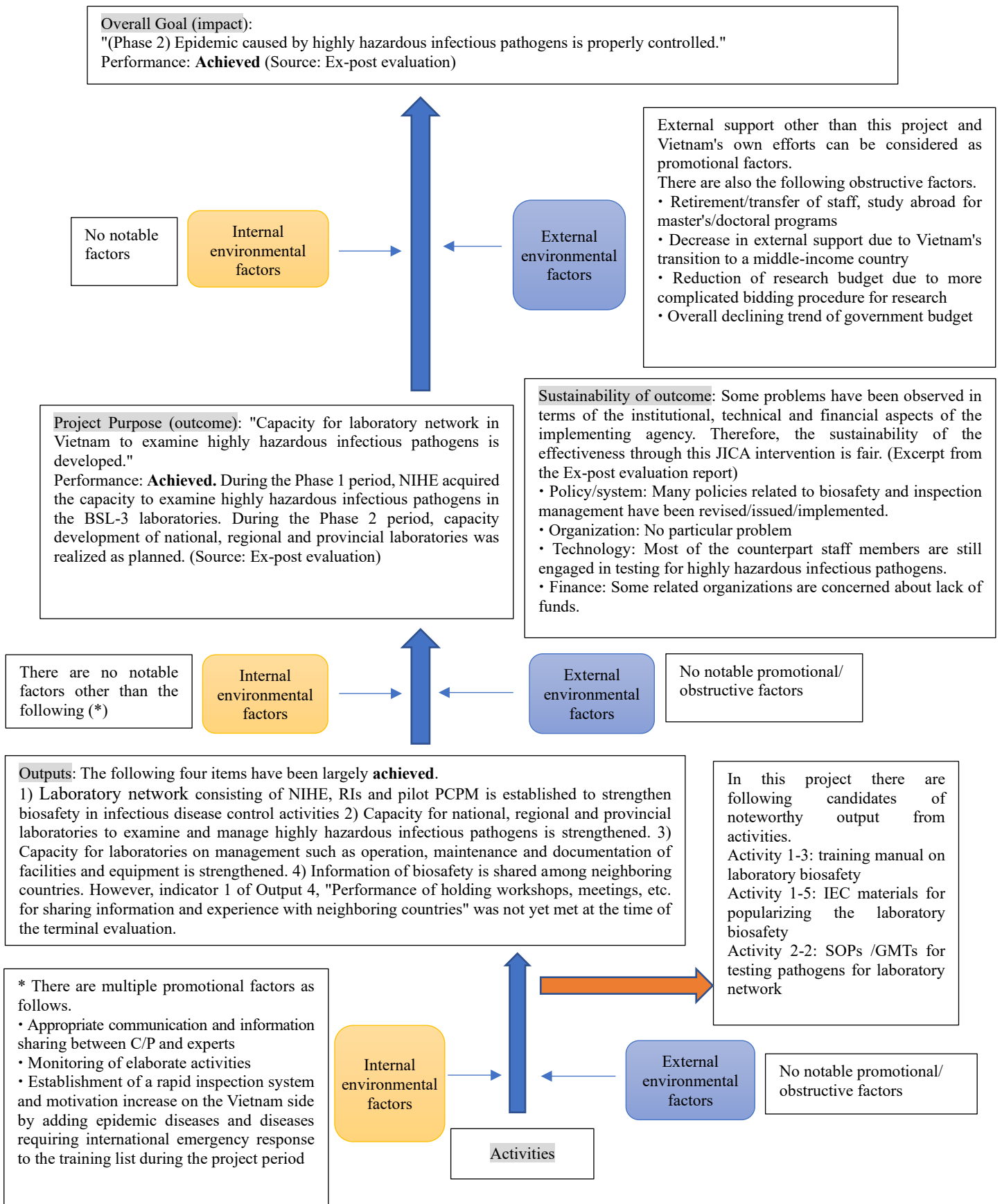
		<p>Related projects: “Capacity development for NIHE to control emerging and re-emerging infectious diseases” (2006-2010), which is the previous phase of the above project, and a Grant Aid Project “The Project for Improvement of Safety Laboratory for National Institute of Hygiene and Epidemiology” (2006-2008) share a common goal of improving NIHE's ability to handle highly hazardous infectious pathogen, and the Technical Cooperation Phase 1 was implemented with the Grant Aid Project. In addition, “The project for Capacity Development for Medical Laboratory Network on Biosafety and Examination of Highly Hazardous Infectious Pathogens in Vietnam, Laos and Cambodia” is in progress.</p> <p>To summarize these project relationships, the “Capacity development for NIHE to control emerging and re-emerging infectious diseases” and the Grant Aid Project have strengthened the laboratory function as a base, and the technical cooperation in this project has enhanced the capacity of multiple bases and realized their networking. Furthermore, the ongoing “The project for Capacity Development for Medical Laboratory Network on Biosafety and Examination of Highly Hazardous Infectious Pathogens in Vietnam, Laos and Cambodia” aims for qualitative enhancement of the network.</p>
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	This noteworthy output is effective when providing nationwide training and collecting and exchanging information related to surveillance and early warning.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	Capacity building of PCPM by NIHE conducted in the project lead to the strengthening of nationwide network. This capacity building is made possible by institutionalization of the Ministry of Health with the support of WHO and USCDC and it is a good reference for the production of such noteworthy output.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>Link to: (Ex-post evaluation)</p> <p><a href="https://www2.jica.go.jp/ja/evaluation/pdf/2018_1000107_4_f.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2018_1000107_4_f.pdf</a></p>

2) Project outline

<b>Case (project) name</b>	
(Technical cooperation project) Project for Capacity Development for Laboratory Network in Vietnam of Biosafety and Examination of Highly Hazardous Infectious Pathogens	
<b>Background of case implementation</b>	
Vietnam has suffered from a variety of infectious diseases, including severe acute respiratory syndrome (SARS) in 2003, and Highly Pathogenic Asian Avian Influenza A (H5N1) in 2004. The National Institute of Hygiene and Epidemiology (NIHE) had been primarily responsible for dealing with highly hazardous infectious pathogens such as avian influenza, SARS, and HIV. Despite the World Health Organization (WHO) requiring highly hazardous infectious pathogen to be handled in biosafety level-three (BSL-3) laboratories, no BSL-3 laboratories existed in Vietnam as of 2006. Under these circumstances, a Grant Aid Project “The Project for Improvement of Safety Laboratory for National Institute of Hygiene and Epidemiology” (2006-2008) to establish Vietnam's first BSL-3 laboratory in NIHE High-Tech Center (HTC), and Phase 1 of the technical cooperation project to strengthen the operational capacity of NIHE's BSL-3 laboratory (2006-2010) were implemented. Although these projects improved NIHE's diagnostic capability, other institutions such as Regional Institute (RI) and Provincial Center for Preventive Medicine (PCPM) were still inadequate in terms of biosafety and diagnostic capability.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal: Epidemic caused by highly hazardous infectious pathogens is properly controlled. Project Purpose: Capacity for laboratory network in Vietnam to examine highly hazardous infectious pathogens is developed.
Outputs	<ol style="list-style-type: none"> <li>1. Laboratory network consisting of NIHE, RIs and pilot PCPM is established to strengthen biosafety in infectious disease control activities.</li> <li>2. Capacity for national, regional and provincial laboratories to examine and manage highly hazardous infectious pathogens is strengthened.</li> <li>3. Capacity for laboratories on management such as operation, maintenance and documentation of facilities and equipment is strengthened.</li> <li>4. Information of biosafety is shared among neighboring countries (Laos, Cambodia, Myanmar, etc.).</li> </ol>
Activities	Activities to achieve the above outputs
Implementation period	February 2011–February 2016
Implementing agencies (Recipient country side)	NIHE, Pasteur Institute of Ho Chi Minh City (PIHCMC), Tay Nguyen Institute of Hygiene and Epidemiology (TIHE), Pasteur Institute of Nha Trang (PINT)
Direct beneficiary	Implementing agency staff
Cooperating Japanese agency	National Institute of Infectious Diseases (NIID)
Participating Japanese experts	2 long-term experts (chief advisors), 1 long-term expert (project coordinator), 16 short-term experts
<b>Case evaluation results (summary)</b>	
<p>This JICA intervention, consisting of Phase 1 (Capacity development for NIHE to control emerging and re-emerging infectious diseases) and Phase 2 (Project for Capacity Development for Laboratory Network in Vietnam of Biosafety and Examination of Highly Hazardous Infectious Pathogens), achieved the Project Purpose of each phase. By the end of Phase 1, NIHE acquired the capacity to examine highly hazardous infectious pathogens in BSL-3 laboratories with international standard. By the end of Phase 2, the laboratory network of NIHE and other examination institutions, namely the RIs and the ten pilot PCPMs, also enhanced capacity to examine highly hazardous infectious pathogens. Such effects have continued, and the Overall Goal of the intervention, i.e., control of epidemic caused by highly hazardous infectious pathogens, have been achieved by the time of the ex-post evaluation. Regarding the sustainability, some problems have been observed in the institutional, technical and financial aspects mainly due to the inability to repair some laboratory equipment and lack of budget, both at the PCPM level. Nevertheless, the sustainability is ensured at NIHE and RIs. As for the efficiency, both project cost and project period exceeded the plan.</p> <p>Considering all of the above points, this JICA intervention is evaluated to be satisfactory. (From the ex-post evaluation report)</p>	

<b>Major noteworthy output produced in this case</b>
A nationwide network of inspection agencies built around the National Institute of Health and Epidemiology (NIHE) in Hanoi
<b>The process by which the noteworthy output concerned was produced</b>
The network was constructed through implementation of the activities (8 items) related to the above Output 1.
<b>Process by which the noteworthy output was used</b>
The establishment of such a network has led to more active and reliable requests for training (PCPM)/implementation (institute), support from laboratory for examination that cannot be performed, information exchange, etc. in accordance with the government regulations.

### 3) Logic model



Noteworthy Output 8. A total of 277 laboratory technicians having enhanced capabilities in 64 countries

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	A total of 277 laboratory technicians having enhanced capabilities in 64 countries
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Human resources
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Knowledge Co-Creation Program (KCCP) Region: Worldwide Approach to be taken (testing/research/early warning): Testing Infectious diseases: Various infectious diseases including HIV
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Although infectious diseases including HIV/AIDS are an urgent public health issue, laboratory technicians who have the knowledge and test skills necessary for diagnosis of infectious diseases are insufficient in developing countries. Laboratory technicians who work at reference laboratories <sup>11</sup> testing a large number of specimens help ensure the quality of diagnosis and have a critical role in research. Therefore, they are the key resources to control infectious diseases.
5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	Most of the trainees use the knowledge and skills acquired through the training at their laboratories after returning home to contribute to the implementation of appropriate tests. The knowledge and skills acquired through the training have been used in the tests and diagnosis of the COVID-19 since 2020.
6. Main user	Identify users of the noteworthy output	Reference laboratories and similar laboratories
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Persons suspected of having infectious diseases
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Laboratory technicians who have the knowledge and skills necessary for testing and diagnosis of infectious diseases are insufficient in developing countries. In addition, human resources that can appropriately conduct special diagnostic tests or

<sup>11</sup> They play important roles in examination and diagnosis of infectious diseases, such as national standardization and technical advice to medical facilities and laboratories.

		research as well as external quality assessment of test results are insufficient. This noteworthy output addresses these issues.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The trainees who participated in this training have been involved in the developments of guidelines or protocols in each country to be recognized to some extent within each health ministry.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Name of the project from which the noteworthy output was identified: Strengthening Laboratory Techniques and Surveillance System for Global Control of HIV and Related Infectious Diseases Cooperation period: 2017–2019 Related projects: AIDS Virus Infection Diagnostic Skills (1993–1997), AIDS Virus Infection Diagnostic Skills (1998–2002), Advanced Diagnostic Skills for Care and Management of HIV-infected Persons (2003–2007), HIV Infection Testing Management for Diagnosis and Monitoring (2008–2010), HIV Infection Testing Skills for HIV Infection Diagnosis and Monitoring (2011–2013), and Test Skills and Laboratory Management for HIV Control, Including Surveillance (2014–2016)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The trained laboratory technicians can contribute to carrying out special diagnostic test and research, including genomic analysis, external quality assurance of tests conducted at hospitals, and developing guidelines and protocols of their own countries.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	Below is the point to keep in mind when generating the noteworthy output. - To achieve the Project Purpose, it is necessary to have close talks on the criteria for selecting trainee candidates, such as work experience and educational background, with the counterpart governments, and then select trainees. - To establish and maintain good relationship with the counterpart agency in order to conduct appropriate training with updated the training module and methods.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	Training project outline <a href="https://www.jica.go.jp/activities/schemes/tr_japan/summary/lineup2019/sector/ku57pq00002jvqff-att/201984426_j.pdf">https://www.jica.go.jp/activities/schemes/tr_japan/summary/lineup2019/sector/ku57pq00002jvqff-att/201984426_j.pdf</a>

		JICA website <a href="https://www.jica.go.jp/topics/2020/20200527_01.html">https://www.jica.go.jp/topics/2020/20200527_01.html</a>
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2) Project outline

<b>Case (project) name</b>				
(Knowledge Co-Creation Program) Strengthening Laboratory Techniques and Surveillance System for Global Control of HIV and Related Infectious Diseases				
<b>Background of case implementation</b>				
<p>In 1993, the "JICA AIDS International Training Course" (general term) started for the purpose of training AIDS test technicians, mainly in the Asian region. Since then, it has been continued every year while responding to the new trends of infectious diseases and technological innovations in real time, as well as updating the training course names and training contents six times. To contribute to achievement of the 90-90-90 target<sup>12</sup> (the year to achieve the target is 2020), which was advocated by the Joint United Nations Programme on HIV/AIDS (UNAIDS), the Knowledge Co-Creation Program "Strengthening Laboratory Techniques and Surveillance System for Global Control of HIV and Related Infectious Diseases" was provided for laboratory technicians from Asia, Africa, the Middle East, and South America, each year in 2017-2019. In the training, at the top reference laboratory in Japan, lectures on basic knowledge necessary for diagnosis and monitoring of various infectious diseases including HIV/AIDS, and practical training on test skills, laboratory maintenance and accuracy control, data management, etc., were given for improving laboratory-wide management systems. In addition, site visits were conducted to understand the role sharing and coordination in surveillance systems for infectious disease control between the central government and local governments, and reviews and discussions were also held. Urgent efforts are required for control of infectious diseases, including HIV/AIDS, which is one of the three major infectious diseases. This training is the only Knowledge Co-Creation Program that covers test skills necessary for diagnosis, monitoring, and follow-up for global control of HIV/AIDS and other infectious diseases. From the beginning of this training, the National Institute of Infectious Diseases has been involved as the implementing agency. Since 1993, a total of 277 trainees from 64 countries have been accepted.</p>				
<b>Implementation year</b>				
<b>Training course name</b>				
<b>Training period</b>				
<b>Main target areas</b>				
<b>Features/Changes</b>				
1993–1997 (5 times)	AIDS Virus Infection Diagnostic Skills	6 weeks	Asia	Lectures given by lecturers from the National Institute of Infectious Diseases and guest lecturers, and practical training and visits focusing on serological diagnosis
1998–2002 (5 times)	AIDS Virus Infection Diagnostic Skills	6 weeks	Pacific states, Southeast Asia, and Africa	Lectures given by lecturers from the National Institute of Infectious Diseases, practical training focusing on serological diagnosis, and visits
2003–2007 (5 times)	Advanced Diagnostic Skills for Care and Management of HIV-Infected Persons	5 weeks	Pacific states, Southeast Asia, and Africa	Lectures given by lecturers from the National Institute of Infectious Diseases, transition to practical training focusing on nucleic acid, and visits
2008–2010 (3 times)	HIV Infection Testing Management for Diagnosis and Monitoring	5 weeks	Asia and Africa	Target trainees limited mainly to those from reference laboratories, PCR workshops, and visits
2011–2013 (3 times)	HIV Infection Testing Skills for HIV Infection Diagnosis and Monitoring	5 weeks	Asia and Africa	PCR workshops, new practical training on DNA sequence analysis, and visits

Table 1: History and outline of "JICA AIDS International Training Course"<sup>13</sup>

<sup>12</sup> The 90-90-90 target aims, as a global goal to end the AIDS epidemic, to allow "90% of HIV-positive persons to know their infection," "90% of the persons knowing their HIV infection to receive antiretroviral treatment," and "90% of the persons receiving the treatment to have low viral load in their bodies" by 2020.

<sup>13</sup> Source: National Institute of Infectious Diseases, Infectious Agents Surveillance Report (IASR) Vol. 39, No. 9 (No. 463), September 2018

2014–2016 (3 times)	Test Skills and Laboratory Management for HIV Control, Including Surveillance	5 weeks	Asia and Africa	Introduced lectures on surveillance and laboratory management, enhanced practical training on DNA sequence analysis, and visits
2017–2019 (3 times)	Improvement In Test Skills and Surveillance for Control of Various Infectious Diseases Including HIV	6 weeks	Asia and Africa	Introduced lectures on HIV-related infectious diseases, improved lectures on surveillance, enhanced practical training on DNA sequence analysis, and visits

**Case outline** (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)

Goals	The knowledge and skills acquired through the training in Japan is disseminated at the trainees' organizations. The relevant knowledge and skills include the theoretical background and knowledge necessary for diagnosis and monitoring of various viral infectious diseases including HIV/AIDS, the test skills for the infectious diseases, the systems for data management and laboratory management, and how to establish an effective surveillance system by strengthening coordination inside and outside a laboratory.		
Outputs	<ol style="list-style-type: none"> <li>1. Acquisition of knowledge on the theoretical background and test skills, necessary for diagnosis and monitoring of various related infectious diseases including HIV/AIDS.</li> <li>2. Acquisition of knowledge on biosafety, laboratory management, and laboratory management systems based on 5S-KAIZEN (Sort, Set in order, Shine, Standardize, and Self-discipline), etc.</li> <li>3. Acquisition of knowledge on infectious disease surveillance systems.</li> </ol>		
Activities	<b>Approach</b>	<b>Contents</b>	
	29 lectures and discussions	Virology, care and treatment of various viral infection cases, the infectious disease surveillance system in Japan, treatment of viral infectious diseases including antiretroviral therapy, various viral infectious disease, biosafety, virus laboratory management including 5S-KAIZEN-TQM steps, data management, quality control, diagnosis of various viral infectious diseases, PCR, safety and screening of blood transfusion, DNA sequencing, immunology, vaccines for various viral infectious diseases, molecular epidemiology of various viruses, and drug resistance	
	9 practical training sessions	Laboratory/BSC use, serodiagnosis of various viral infections, DNA-PCR, quantitative PCR, RT-PCR, DNA sequencing, CD4 count, and PCR workshop	
	Visits to 5 places	Visits to the National Center for Global Health and Medicine, the Hiroshima City Institute of Public Health, the Osaka Institute of Public Health, the Japanese Red Cross Kanto-Koshinetsu Cord Blood Bank, and SRL, Inc.	
	Others	Presentation of country reports, exchange of opinions, discussion for problem solving based on training results, and preparation and presentation of action plans	
Implementation period	2017–2019		
Direct beneficiary	Laboratory technicians of reference laboratories that examine and diagnose various viral infectious diseases, and laboratory technicians of organizations that conduct infectious disease surveillance.		
Cooperating Japanese agency	JICA		
Participating Japanese experts	National Institute of Infectious Diseases (NIID)		

**Case evaluation results (summary)**

The Project Purpose is presumed to be almost achieved. According to the reports of follow-up surveys conducted in Ghana and Tanzania in 2012, in Myanmar in 2017, and in Zimbabwe in 2019, the returning trainees' knowledge and test skills necessary for diagnosis of infectious diseases contributed to improvement in infectious disease diagnosis in their own countries. Most of the trainees were in a leadership position in their laboratories and contributed to dissemination of the techniques. In laboratory management, they worked on improvement of laboratory work and management through 5S-KAIZEN, which was useful for improving work efficiency, conducting accurate tests, and preventing laboratory infection. In the above four countries, the implementation status of each action plan was basically good, which led to solving problems in the laboratories. On the other hand, it was difficult to execute action plans beyond their duties. There are returning trainees in 64 countries, while follow-up surveys have been conducted only in some countries. However, the results are presumed to be almost the same in the other countries as well.

**Major noteworthy output produced in this case**

A total of 277 laboratory technicians having enhanced capabilities in 64 countries

**The process by which the noteworthy output concerned was produced**

Knowledge Co-Creation Program is a training, the contents of which are planned by Japan and proposed to developing countries. The training was implemented through partnership with domestic specialized agencies so that Japan's knowledge and experience would contribute to solving issues in developing countries. The basic flow from the recruitment of trainees to follow-up after returning home in Knowledge Co-Creation Program is shown below.

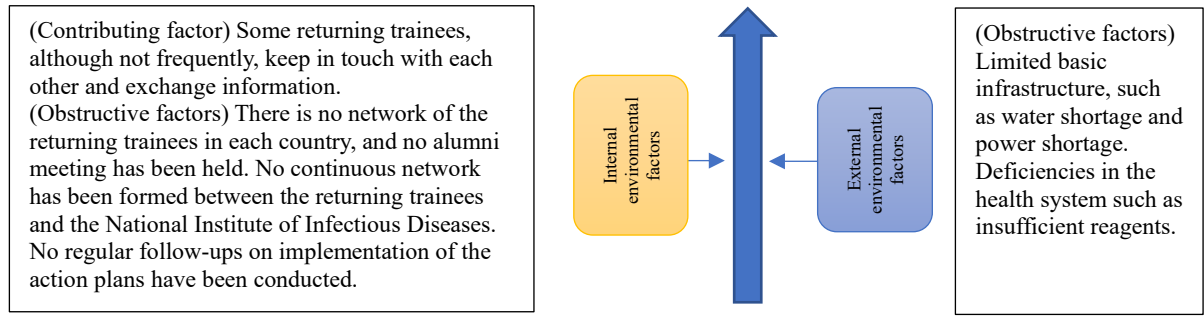
Recruitment/Selection	<ul style="list-style-type: none"> <li>JICA sends application information on training to a recipient government. The recipient government selects candidates who meet the requirements.</li> <li>Candidates submit applications to JICA. JICA screens the applications and select participants (trainees).</li> </ul>
Arrival in Japan	<ul style="list-style-type: none"> <li>After the trainees' arrival in Japan, JICA holds a briefing and orientation prior to the beginning of training. Through this program, living information necessary during their stay in Japan and knowledge useful for understanding Japan are shared among trainees.</li> </ul>
Training	<ul style="list-style-type: none"> <li>Training contents are planned and performed through the course. A course consists of lectures, practical training, visits, discussions, and workshops.</li> </ul>
Completion	<ul style="list-style-type: none"> <li>At the end of training, an evaluation meeting is held to confirm the effects of training and to hear proposals and opinions for future training improvements.</li> <li>A closing ceremony is held, and a certificate of completion is given to each trainee who has successfully completed all the training.</li> </ul>
Follow-up after returning home	<ul style="list-style-type: none"> <li>Returning trainees implement their action plans in their organizations.</li> </ul>

**Process by which the noteworthy output was used**

The returning trainees' knowledge and skills necessary for testing and diagnosis of infectious diseases contributed to improvement in infectious disease diagnosis. Most of the trainees were in a leadership position in their laboratories and passed on their knowledge to other staff. In laboratory management, they worked on improvement of laboratory work and management through 5S-KAIZEN, which was useful for improving work efficiency, conducting accurate tests, and preventing laboratory infection. The appropriate PCR testing skills acquired through this training is widely used for infectious diseases other than HIV. For example, most of the returning trainees are engaged in PCR tests of the COVID-19 in reference laboratories or similar institutes, and the PCR testing technique acquired through the training is utilized at the forefront of the COVID-19 control. In addition, the implemented action plans were useful for improving the efficiency of laboratory work, conducting accurate tests, and preventing laboratory infection.

3) Logic model

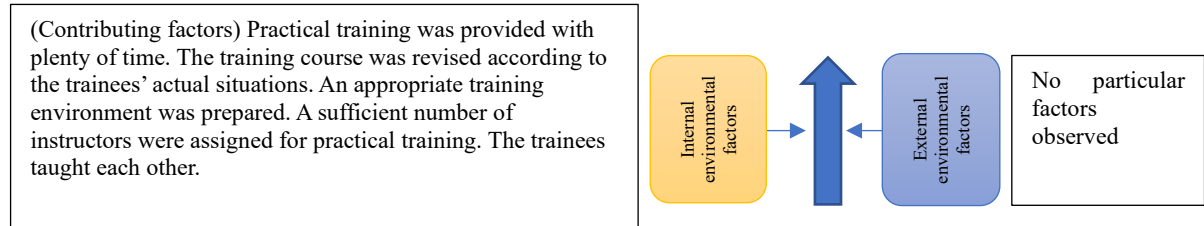
**Overall Goal (Impact):** "Dissemination of the knowledge and techniques acquired by the trainees after returning home, implementation of the formulated action plans, and contribution to control of HIV and other infectious diseases."  
 Degree of achievement: **Presumed almost achieved** (Source: Follow-up survey report)  
 According to the reports of follow-up surveys conducted in Ghana and Tanzania in 2012, in Myanmar in 2017, and in Zimbabwe in 2019, the returning trainees' knowledge and test skills necessary for diagnosis of infectious diseases contributed to improvement in diagnosis of infectious diseases. Most of the trainees were in a leadership position in their laboratories and contributed to dissemination of the techniques. In laboratory management, they worked on improvement of laboratory work and management through 5S-KAIZEN, which was useful for improving work efficiency, conducting accurate tests, and preventing laboratory infection. In addition, in the above four countries, the implementation status of each action plan was basically good, which led to resolving issues of the laboratories. On the other hand, it was found difficult to execute action plans beyond their duties. There are returning trainees in 64 countries, while follow-up surveys have been conducted only in some countries. However, the results are presumed to be more or less the same in the other countries as well.



**Outputs:** 1) Acquisition of knowledge on the theoretical background and test skills necessary for diagnosis and monitoring of various infectious diseases including HIV/AIDS. 2) Acquisition of knowledge on biosafety, laboratory management, and laboratory management systems based on 5S-KAIZEN, etc. 3) Acquisition of knowledge on the infectious disease surveillance systems.  
 Degree of achievement: **Presumed almost achieved** (Source: 2019 Project Completion Report)  
 In the feedback sheets submitted after the lectures, practical training sessions, and visits, opinions on usefulness, comprehension, and the length of time were inquired. No pre-test or post-test to evaluate the acquired knowledge or techniques was conducted. Therefore, the degrees of achievement of the outputs are unconfirmed. However, since the follow-up surveys confirmed improvement in test skills, the degrees of achievement of the outputs are presumed high.

**Sustainability of the outcome: Partially restricted.**  
 Although the transferred skills are almost established, it is a challenge that the trained human resources may change to other, better-paid posts in the private sector or NGOs.

**Noteworthy Output: A total of 277 laboratory technicians having enhanced capabilities in 64 countries**



**Activities:** Lectures on basic knowledge on HIV/AIDS and various related infectious diseases, laboratory management, and surveillance. Practical training or exercise of serodiagnosis, basic PCR, RT-PCR, and base sequence analysis. Visits to the National Center for Global Health and Medicine, the Hiroshima City Institute of Public Health, the Osaka Institute of Public Health, the Japanese Red Cross Kanto-Koshinetsu Cord Blood Bank, and SRL, Inc. Formulation and presentation of action plans.

Noteworthy output 9. Human resources who can implement effective measures to address antimicrobial resistance (AMR) and healthcare-associated infections, including COVID-19

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Human resources who can implement effective measures to address antimicrobial resistance (AMR) and healthcare-associated infections, including COVID-19
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Human resources
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Knowledge Co-Creation Program (KCCP) Region: Asia, Africa Approach to be taken (testing/research/early warning): Early warning Infectious diseases: antimicrobial resistance (AMR)/healthcare-associated infections
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	As responding to threatening infectious diseases such as COVID-19, Ebola virus disease, and antimicrobial resistance has recently become an urgent issue, each country lacked human resources who can implement effective measures to address antimicrobial resistance and healthcare-associated infections, and there was an urgent need to develop such human resources.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	The trainees who have learned from the trainings have applied much of what they learned after returning to their countries, and their knowledge is being effectively utilized in the following ways. (1) According to the follow-up survey results, although there was a shortage of goods, progress on all items of the action plan was good. (In Liberia, "Sharing of acquired skills with other staff," "Monitoring of hand hygiene adherence rate," and "Implementation of measures to improve staff motivation" were carried out. In Sierra Leone, "Conducting baseline survey," "Providing training to other staff and information sharing with them," "Improving motivation for infection prevention and management," and "Implementing infection prevention and management plan" were confirmed.) (2) Hand hygiene is the most important issue, although there are some issues with the timing. When water and sewage systems are failing, the trainees made possible arrangements and prepared tools, such as using running water from buckets and soaps (some are solid soaps) or rub-in alcohol hand sanitizer, so that they could put their knowledge learned in the trainings into practice on site.

		(3) Regarding medical waste, the trainees focused their activity on sorting, and made efforts to create posters for waste separation and change the colors of the waste boxes.
6. Main user	Identify users of the noteworthy output	Healthcare workers working in core hospital-level medical facilities in the country that have nosocomial infection control teams or the equivalent.
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Medical workers above and residents who use the medical facilities
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	By utilizing the human resources that had been lacking in each country, appropriate measures against antimicrobial resistance and healthcare-associated infections were implemented.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	Since health administration officers, hospital top management, or infection management persons are supposed to be invited, it is presumed that the trainees who have completed the training have a certain level of recognition among the people concerned in the country.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Since the program started as "Antimicrobial Resistance and Healthcare-Associated Infections Control" in 2003, it has been provided once or twice a year, and by January 2021 a total of 21 training sessions have been held through several project updates. (The number of trainees is 7 to 12 for each session)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	In the phases of healthcare-associated infections management by the Ministry of Health and medical institutions in developing countries, the human resources are used.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	As a point to pay attention to in producing the noteworthy output, it is necessary to set the criteria in advance for selecting trainees, such that the trainees are required to have the qualities to be "managers" and be in such a position.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	[Video] JICA Knowledge Co-Creation Program (KCCP) "Antimicrobial Resistance and Healthcare-Associated Infections Control" <a href="https://www.youtube.com/watch?v=XA5B4LTTcxQ">https://www.youtube.com/watch?v=XA5B4LTTcxQ</a> Training reports on each session Knowledge Co-Creation Program (KCCP) "Antimicrobial Resistance and Healthcare-Associated Infections Control" Follow-up survey report (Republic of Sierra Leone/Republic of Liberia, June 2017)

## 2) Project Outline

<b>Case (project) name</b>	
(Knowledge Co-Creation Program (KCCP)) Antimicrobial Resistance and Healthcare-Associated Infections Control	
<b>Background of case implementation</b>	
Responding to threatening infectious diseases such as COVID-19, Ebola virus disease, and antimicrobial resistance has recently become an urgent issue, especially in developing countries, where sufficient countermeasures have not been taken due to inadequate training for healthcare workers and limited equipment and resources.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal: No clear Overall Goal has been set. Training goal: Trainees are able to implement more effective antimicrobial resistance (AMR) and healthcare-associated infection control including COVID-19 at the facilities to which they belong.
Outputs	Although no clear output goal has been set, the following outputs were expected (common denominators of the training). 1) Understand the basics of antimicrobial resistance and healthcare-associated infection management 2) Understand the practice of antimicrobial resistance and healthcare-associated infection management 3) Organize thoughts for solving problems about healthcare-associated infection control in trainees' own countries and facilities to which they belong.
Activities	Throughout its long history, JICA has continuously made improvements based on the lessons learned from the previous sessions. In the training in January 2021, the following ideas were realized. (1) Comprehensive and systematic training structure, (2) Lectures/observation tailored to the trainees' background, (3) Lectures/exercises for action planning, (4) One of the trainees becomes Today's leader, (5) 5 members of the Bureau of International Health Cooperation, National Center for Global Health and Medicine organize the training as leader, sub-leader, and technical advisor.
Implementation period	Ongoing from 2003 to present (2021)
Implementing agencies (Recipient country side)	Core hospital-level medical facilities, especially medical facilities closely related to existing Japanese technical cooperation, grant aid projects, ODA loan projects.
Direct beneficiary	Healthcare workers working in core hospital-level medical facilities in the country that have nosocomial infection control teams or the equivalent.
Cooperating Japanese agency	National Center for Global Health and Medicine
Participating Japanese experts	Appointed by the Bureau of International Health Cooperation, National Center for Global Health and Medicine
<b>Case evaluation results (summary)</b>	
The satisfaction level of the trainees in each session was high, and the formulated action plans include appropriate items that can be realized after returning to their countries. In 2017, JICA conducted a field survey in two countries, Liberia and Sierra Leone, after 4 people participated in the training. Although there was a shortage of funds and equipment, it was confirmed that progress on all items of the action plan was good. (From the follow-up survey report of Knowledge Co-Creation Program (KCCP) "Antimicrobial Resistance and Healthcare-Associated Infections Control")	
<b>Major noteworthy output produced in this case</b>	
Human resources who can implement effective measures to address antimicrobial resistance (AMR) and healthcare-associated infections, including COVID-19	
<b>The process by which the noteworthy output concerned was produced</b>	
Implementation of training is the production process of the noteworthy output (human resources). Over its long history, JICA has continuously improved training goals, unit goals, and curriculum in line with issues that are attracting global attention. As a result, the effectiveness of skills acquired by trainees has been continuously improved. From the 2017 on-site follow-up survey result, based on the situation that returning trainees are making specific arrangements such as development of feasible technologies on site, use of 5S, and responding to cases where water service is not available, the training programs have been	

further improved. In 2021, JICA held the training online for the first time due to the spread of COVID-19. With various innovations such as creating experience videos and using online discussions, participating trainees gave high evaluation results equivalent to face-to-face training.

**Process by which the noteworthy output was used**

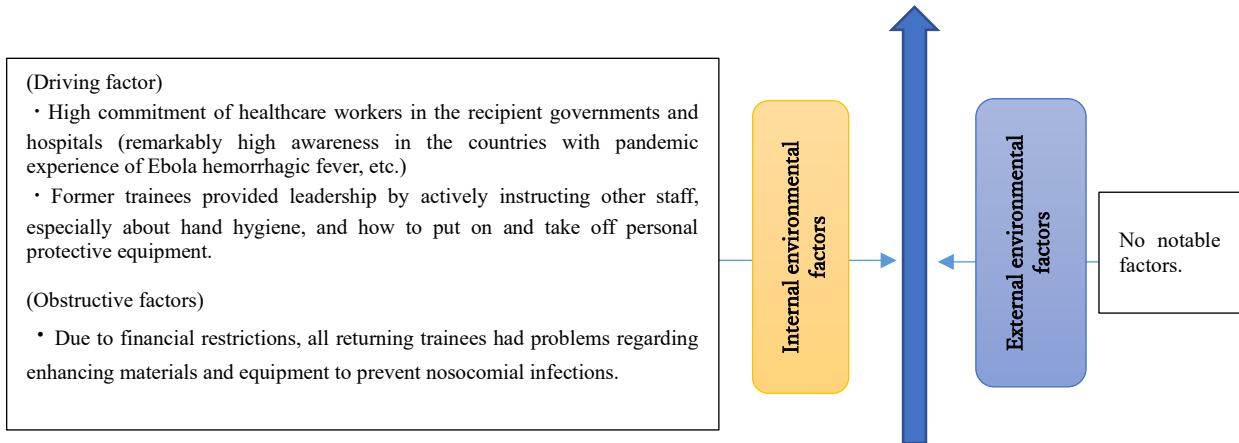
Returning trainees were appointed as leaders of healthcare-associated infection management in the facilities. Since their appointment, they have actively instructed other staff about hand hygiene, how to put on and take off personal protective equipment, etc. Also, with the understanding of the facility manager, when water and sewage systems are failing, they have proactively developed practicable methods on site, such as use of running water from buckets and soaps (some are solid soaps) or rub-in alcohol hand sanitizer. In some cases, the facility manager accepted their proposals and improved the infrastructure.



### 3) Logic Model

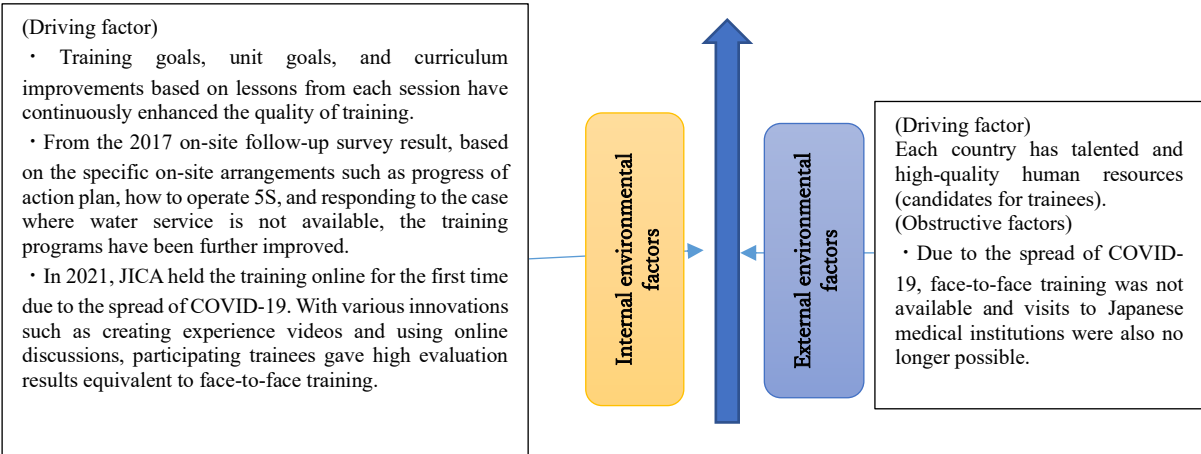
**Goal:** Trainees are able to implement more effective measures to address antimicrobial resistance (AMR) and healthcare-associated infections including COVID-19 at the facilities to which they belong.

(Performance) Based on the evaluation results during the training and the follow-up survey results in June 2017, it is considered that the goal mentioned above has been almost achieved. The satisfaction level of the trainees in each session was high, and the formulated action plans include appropriate items that can be realized after they return to their countries. In 2017, JICA conducted a field survey in two countries, Liberia and Sierra Leone, after 4 people participated in the training. Although there was a shortage of funds and equipment, it was confirmed that progress on all items of the action plan was good. (From the follow-up survey report of Knowledge Co-Creation Program (KCCP) "Antimicrobial Resistance and Healthcare-Associated Infections Control") (Republic of Sierra Leone/Republic of Liberia) June 2017)



**Output level:** The following unit goals during the training were achieved at a high level. (From each evaluation report from 2012 to 2021)

- (1) Understand the basics of AMR and healthcare-associated infections measures
- (2) Acquire knowledge and skills for practicing AMR and healthcare-associated infections measures.
- (3) Based on the training output, identify problems about controlling nosocomial infections including COVID-19 in trainees' own countries and facilities to which they belong, and create an action plan to resolve them.



**Activity level:** Throughout its long history, JICA has continuously made improvements based on the lessons from the previous sessions. In the training in January 2021, the following ideas were realized. (1) Comprehensive and systematic training structure, (2) Lectures/observation tailored to the trainees' background, (3) Lectures/exercises for action planning, (4) One of the trainees becomes Today's leader, (5) 5 members of the Bureau of International Health Cooperation, National Center for Global Health and Medicine organize the training as leader, sub-leader, and technical advisor.

Noteworthy output 10. More than 1,700 human resources (in 92 countries) developed in the international tuberculosis training that has been conducted for nearly 60 years

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	More than 1,700 human resources (in 92 countries) developed in the international tuberculosis training that has been conducted for nearly 60 years
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Human resources
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Knowledge Co-Creation Program (KCCP) Region: All over the world Approach to be taken (testing/research/early warning): Testing/research Infectious disease: Tuberculosis (TB)
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	With 10.4 million new cases and 1.8 million deaths worldwide each year, TB is one of the world's ten leading causes of death and the leading cause of death among single infectious diseases. There are also patients who have multidrug-resistant TB* for which conventional drugs do not work and who are coinfecting with HIV/AIDS. Since many TB patients are young and in their prime, the disease has caused significant social and economic losses around the world. In order to overcome such a situation, WHO has set up the End TB Strategy and aims to end the TB epidemic by 2035, and the theme of the Training Project is closely related to the global initiative. (The above was created based on the "JICA Health Care Task Newsletter (issued on July 20, 2018)") The noteworthy output of the Training Project is the "administrative officers engaged in TB control at central and local governments" and "senior laboratory technicians at provincial and higher levels of governments," who are highly trained through the Training, and they are key human resources in the world's fight against TB. * A type of TB that is resistant to isoniazid and rifampicin, the most potent first-line drugs available for TB treatment.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	Many of the Training's former trainees are at the forefront of TB control at international organizations and national governments.
6. Main user	Identify users of the noteworthy output	International and government agencies as the employers of the human resources
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	General public (Final beneficiary)
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been	The following purposes of the Training have by and large been fulfilled: training administrative officers at central and local governments so they

	resolved.	<p>will acquire knowledge about UHC*<sup>1</sup> and the End TB Strategy*<sup>2</sup> and skills to strengthen TB control in their countries (Control Course); and training, toward UHC, senior laboratory technicians at provincial and higher levels of governments so they will acquire techniques to detect TB and drug-resistant TB, techniques to conduct testing for TB infection, and laboratory management skills (Laboratory Course).</p> <p>*1. UHC (Universal Health Coverage): A state in which all individuals on the planet can receive basic healthcare services, declared in the “Basic Design for Peace and Health”</p> <p>*2. End TB Strategy: Adopted at the World Health Assembly in May 2014, it is a strategy to reduce the deaths and incidence of TB patients and end the TB epidemic. It consists of the following three pillars: 1. integrated, patient-centered care and prevention; 2. bold policies and supportive systems; and 3. intensified research and innovation.</p> <p>(Source: <a href="https://www.jica.go.jp/project/thailand/020/news/20180829.html">https://www.jica.go.jp/project/thailand/020/news/20180829.html</a>)</p>
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The Japan Anti-Tuberculosis Association, which serves as the implementing agency of the Training Project, received the Karel Styblo Public Health Prize in 2016 from the International Union against Tuberculosis and Lung Disease (The Union) for its longer-than-70-year contribution to TB control. The award was granted to recognize the Association’s global efforts of that started in 1963, such as the <u>continuous implementation of JICA international training projects aimed at developing people with the ability to work for TB control around the world</u> at the Research Institute of Tuberculosis.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name: International Training Courses on Tuberculosis Control Implementation period of the Training: 1963–the present (2021)
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	Planning and implementing effective anti-TB measures, and conducting proper testing for TB infection (and allocating human resources for conducting such testing) around the world
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	It is an important prerequisite to select trainees with proper qualifications for the effective development (production) of human resources (noteworthy output). (The first step taken by the Research Institute of Tuberculosis toward the development of noteworthy output (human resources) through International Training Courses on Tuberculosis Control is to prioritize countries in which the

		training is to be conducted, with first priorities given to the countries facing bigger TB problems and those in which the demand for the human resource development for TB control is higher. The Association also makes it a priority to select those who are already professionally involved in TB control at the phase of paper-based screening. <sup>14)</sup>
13.Presentation of specific content	Add a link to the actual study reports/evaluation reports	Link: Japan Anti-Tuberculosis Association's website, " <a href="https://www.jatahq.org/">https://www.jatahq.org/</a> "

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<sup>14</sup> The Research Institute of Tuberculosis has taken the following strict stance: "There are countries that screen out clinicians or administrative officers with zero involvement in TB control as trainee candidates. It may turn out, however, that nobody is selected as trainees from such countries." (Source: "Human resource development in tuberculosis control: Work and role of the Research Institute of Tuberculosis, Japan Anti-Tuberculosis Association," J. Natl. Inst. Public Health, 49 (1): 2000)

## 2) Project outline: International Training Courses on Tuberculosis Control

### (1) Background and overview of the Training

JICA, which was established as OTCA (Overseas Technical Cooperation Agency) in 1962, regarded international training as one of its core projects. The Research Institute of Tuberculosis, received Thai health nurses as trainees and successfully trained them at various divisions in the same year. It was highly evaluated by JICA and the first international training, a six-month program, was launched in June 1963. The first international training program was conducted by using English-translated materials designed to train Japanese physicians. The Japan Anti-Tuberculosis Association has since been engaged in the Training Project for nearly 60 years.

However, the content of training programs has been revised or updated to reflect the progress in TB control and respond to changes in TB issues. During the period from the mid-1990s to the mid-2000s, focus was given to the establishment and expansion of the DOTS Strategy,<sup>15</sup> the core strategy for TB control. Since the Stop TB Strategy 2006–2015 was launched, focus has been given to enhance measures against TB/HIV co-infection and multidrug-resistant TB, although DOTS has remained the basic strategy.

(2) Total number of trainees: According to the latest data of the Centre for International Cooperation and Global TB Information at the Research Institute of Tuberculosis of the Japan Anti-Tuberculosis Association, 1,733 people in 92 countries received any of the TB training programs offered by the Institute through 2020. The following is the breakdown of the trainees' numbers: those who completed the TB Control Course: 944; those who completed the TB Infection Testing Course: 344; those who completed the Advanced Course (for experienced trainees and instructors): 398; and those who completed the Surgery Course<sup>16</sup>: 47.

### (3) Recent courses of the Training Project

Below are descriptions of the training courses conducted in 2017-2021 in the TB Control Course and the TB Laboratory Course. Eight programs were held in total for the two courses during the four years, all of which were implemented by the Research Institute of Tuberculosis of the Japan Anti-Tuberculosis Association.

#### A. TB Control Course

Year	Program title	Training goal	Implementation period	Number of trainees
2017	Controlling TB in the UHC <sup>17</sup> era	Trainees learn about UHC, the latest TB strategies, and how to monitor and evaluate TB control activities. Trainees also acquire knowledge and skills necessary to develop measures for improving TB control measures taken in their countries.	May 11–Aug. 2	15

<sup>15</sup> DOTS (Directly Observed Treatment, Short Course) is the name of a comprehensive primary healthcare strategy launched by the WHO to find and cure TB patients. (Source: [https://jata.or.jp/terminology/z\\_6.html](https://jata.or.jp/terminology/z_6.html)).

<sup>16</sup> The five-month course on thoracic surgery was launched in 1965 for surgeons in developing countries as an initiative under the Colombo Plan. The Surgery Course was taken by many participants from Indonesia and Afghanistan. However, based on the stance that TB control for the general public should be prioritized over individual TB care in developing countries, the Surgery Course was dissolved in 1974 and shifted to the Microbe Technology Course. (Source: "Human resource development in tuberculosis control: Work and role of the Research Institute of Tuberculosis, Japan Anti-Tuberculosis Association," J. Natl. Inst. Public Health, 49 (1): 2000)

<sup>17</sup> UHC (Universal Health Coverage): A state in which all individuals on the planet can receive basic healthcare services, declared in the "Basic Design for Peace and Health"

2018	Controlling TB in the UHC era	Trainees learn about UHC, the latest TB strategies, and how to monitor and evaluate TB control activities. Trainees also acquire knowledge and skills necessary to develop measures for improving TB control measures taken in their countries.	May 27–July 14	9
2019	Controlling TB in the UHC era with SDGs	Trainees learn about UHC, the latest TB strategies, and how to monitor and evaluate TB control activities. Trainees also acquire knowledge and skills necessary to develop measures for improving TB control measures taken in their countries.	May 29–Aug. 3	7
2021	Controlling TB in the UHC era with SDGs (online program)	Trainees acquire understandings about the impact of the COVID-19 pandemic on TB control, UHC, society, and the economy. Trainees also acquire the ability to put forward ideas that, despite the pandemic, will enhance TB control measures taken in their countries, all the while respecting the End-TB Strategy <sup>18</sup> and UHC initiatives.	February 1–12	9*

\* Number of respondents to the post-program questionnaire

#### B. TB Laboratory Course

Year	Program title	Training goal	Implementation period	Number of trainees
2017	Enhancing TB Testing and Management Skills in the UHC era — Application to Measures against Globally-Threatening Diseases —	Trainees acquire testing skills for detecting TB and multidrug-resistant TB at an early stage. Trainees also acquire management skills.	Sep. 27–Dec. 9	6
2018	Enhancing TB Testing and Management Skills and the UHC era — Application to Measures against Globally-Threatening Diseases —	Trainees acquire testing skills for detecting TB and multidrug-resistant TB at an early stage. Trainees also acquire management skills.	Oct. 14–Dec. 7	8
2019	Controlling TB in the UHC era with SDGs	Trainees learn about UHC, the latest TB strategies, and how to monitor and evaluate TB control activities. Trainees also acquire knowledge and skills necessary to develop measures for improving TB control measures taken in their countries.	May 29–Aug. 3	7
2021	Controlling TB and Drug Resistance in the UHC era — Improving Knowledge and Skills through Implementation Training for Testing Leaders — (Online program)	Trainees acquire knowledge necessary to manage a national/prefectural level of laboratory. Trainees also acquire testing and laboratory accuracy management skills that can be used for SARS-CoV-2 (COVID-19).	May 10–17	9*

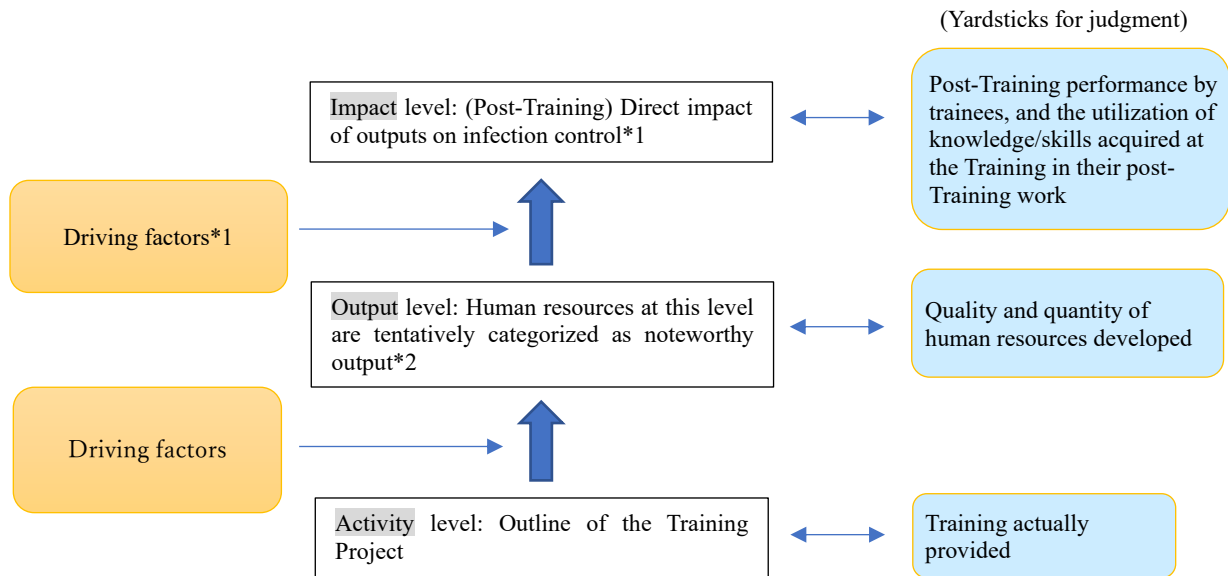
\* Number of respondents to the post-program questionnaire

<sup>18</sup> End TB Strategy: Adopted at the World Health Assembly in May 2014, it is a strategy to reduce the deaths and incidence of TB patients and end the TB epidemic. It consists of the three pillars of 1. integrated, patient-centered care and prevention; 2. bold policies and supportive systems; and 3. intensified research and innovation.

3) Logic model

(1) Shown below is the logic model created for the Training Project.

[Logic Model of the Training Project]



(Note)

\*1. Knowledge lesson candidates will be identified in consideration of internal and external environment factors, just as in the case of scheme-specific projects. Notable cases of ingenuity and approaches taken for the Training Project will be the source of knowledge lessons.

\*2. Human resource development and networking

(2) Level-specific analysis findings

**Activity level:** The Training Project has been conducted as described in (1) Background and overview of the Training in macroscopic terms, and as described in 2), (3) Recent courses of the Training Project in microscopic terms. The activity of the Training Project has been carried out properly based on the know-how accumulated over decades and through the selection of well-timed themes.

**Output level:** An analysis was conducted with regard to the quality and quantity of the trained human resources, which is the main output of the Training Project and is regarded as noteworthy output. When it comes to quantity, the Training Project has already trained more than 1,700 people around the world, as is mentioned in (2) Total number of trainees. When it comes to quality (knowledge and experience acquired), it would be safe to judge it to be high in consideration of the following two factors: (A) the level of achievement against the training goal set per program and (B) evaluation by trainees on programs. Please find the details as follows.

A. The level of achievement seen in samples taken from the afore-mentioned “training courses conducted in 2017-2021”

The table below shows that the average score for achievement level is higher than 3.5 points (with reference to the full score of 4 points) in seven programs out of eight. The achievement level has been very high.

1) TB Control Course

Year	Program title	Level of achievement against training goal*
2017	Controlling TB in the UHC era	3.73
2018	Controlling TB in the UHC era	4.00
2019	Controlling TB in the UHC era with SDGs	3.88
2021	Controlling TB in the UHC era with SDGs (online program)	3.67

\* Average score for four-scale evaluations by individual trainees (4: sufficiently achieved; 1: not achieved)

2) TB Laboratory Course

Year	Program title	Level of achievement against training goal*
2017	Enhancing TB Testing and Management Skills in the UHC era — Application to Measures against Globally-Threatening Diseases —	4.00
2018	Enhancing TB Testing and Management Skills in the UHC era — Application to Measures against Globally-Threatening Diseases —	3.75
2019	Controlling TB in the UHC era with SDGs	3.88
2021	Controlling TB and Drug Resistance in the UHC era — Improving Knowledge and Skills through Implementation Training for Testing Leaders — (Online Program)	3.44

\* Average score for four-scale evaluations by individual trainees (4: sufficiently achieved; 1: not achieved)

B. Trainee narratives identified by analysts from documents provided by the Centre on the level of satisfaction with training programs

Listed below are some narrative feedback statements from trainees on training programs. All the statements are invariably positive, reflecting a high satisfaction level with training programs.

Trainee (Name)	Job title (at the time of the narrative/statement)	Summary of the narrative/statement	Date and time of the narrative/statement	Source
Frank Mugabe Rwabinumi	Acting Chief of National Tuberculosis and Leprosy Control Division, the Ministry of Health of Uganda (Former trainee)	<ul style="list-style-type: none"> <li>• The unique feature of this training program is that, unlike ordinary workshops and conferences, it helped me build a strong relationship of trust with other trainees.</li> <li>• The training program not only provided me with key information about TB but also helped me build capacity for TB control thanks to the practical approach.</li> <li>• The important features of the training program include the following: many of the selected trainees came from countries with limited social and healthcare resources or from countries with serious TB problems; the sharing of information with the trainees about TB control measures taken in their countries; and the creation of action plans and OP (operation research).</li> <li>• Learning about successful TB control measures in Japan gave me the hope that TB control measures in my country would also prove</li> </ul>	July 26, 2012 (At the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control)	Report on the symposium in the left cell, p. 39



		effective despite the high incidence if we do not give up on implementing those measures.		
Prof. Dr. Tjandra Yoga Aditama	Senior Advisor for East Asia Office, the World Health Organization (Trainee of the International Training Course in 1986)	<ul style="list-style-type: none"> <li>• The International Training Course was meaningful in the following three aspects. <ul style="list-style-type: none"> <li>- The knowledge acquired through the training program on TB turned out useful for my job at the Ministry of Health of Indonesia.</li> <li>- I still find the international liaison experience useful.</li> <li>- I learned about approaches for public health control, which have served as a basis when planning measures for public health.</li> </ul> </li> </ul>	The Sept. 2016 issue of "Double-barred cross," No. 370	Same as the left
Dr. Alexandre Manguela	Former Minister of Health of Mozambique (Trainee of the TB Control Course in 1988)	<ul style="list-style-type: none"> <li>• Although my training subject was TB control, I acquired solid leadership skills besides knowledge on TB, and those skills and knowledge I gained at the Research Institute of Tuberculosis have been highly useful to my career as a physician.</li> <li>• Everything I learned through the course at the Research Institute of Tuberculosis turned out to be useful in enhancing my expertise on medical care.</li> </ul>	The July 2016 issue of "Double-barred cross," No. 369	Same as the left

**Impact level:** In analyzing the impact of the Training Project, analysts divided the information identified from documents provided by the Centre into the following two categories: (A) contributions to trainees' career path building; and (B) use of the knowledge gained through the training by trainees in their work and contributions to TB control through their work. Both A and B have a long list of contributions, indicating the significance of direct and indirect impact of the international TB training on TB control measures taken by countries around the world.

A. Contributions to trainees' career path building: Shown below are examples of trainees, some of whom now occupy important positions in their countries' TB control and others of whom are working as specialists.

[Post-Training Promotions]

- Eight trainees were appointed as the heads of the National Tuberculosis Reference Laboratory (NTRL).<sup>19</sup> These trainees, who met or meet at conferences frequently as the heads of the NTRL, have helped solidify the network of former trainees.
- Dr. Alexandre Manguela (Minister of Health, Mozambique; a trainee of the TB Control Course in 1988) said as follows at the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control: "The knowledge I acquired through the TB Control Course turned out to be

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<sup>19</sup> Two in Thailand; one in the Philippines; two in Cambodia; one in Vietnam; one in Myanmar; and one in Mongolia

useful in improving the quality of provincial-level activities. The knowledge was also useful in planning measures against malaria, Hansen's disease, and other infectious diseases as well as even non-infectious diseases. I also found it very useful to have learned about organic integration with other programs. In fact, the experience based on the learning has led me to positions at the national government."

- Wayan Dianitika (Indonesian trainee (Lab), A (L2007)): According to an English article (JICA),<sup>20</sup> he was promoted from a local-level officer to a national-level TB testing coordinator.

[Global TB testing consultants] (International consulting work in Bhutan, Myanmar, Nepal, Indonesia, etc.)

- The afore-mentioned Thai trainee (Lab) A (L1991)
- Thai trainee (Lab) C (L1994) (Deceased)

[Other contributions]

- Many trainees are TB testing coordinators for local governments, and many of them have served as facilitators or resource persons in training programs conducted by the national governments in their countries.

(Cambodia, Thailand, Afghanistan, Kenya, the Philippines, etc.)

B. Use of the knowledge gained through the training by trainees in their work and contributions to TB control through their work

- Frank Mugabe Rwabinumi (former trainee, Acting Director of the National Tuberculosis and Hansen's Disease Control Division, the Ministry of Health of Uganda<sup>21</sup>): He made a presentation at the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control<sup>22</sup> and said, "This training provided the foundation for our TB control (in Uganda) and the evidence-based knowledge we need to plan improvements."
- Tjandra Yoga Aditama (former trainee, Director of Disease Control and Environmental Health Bureau,<sup>23</sup> the Ministry of Health of Indonesia): He made a presentation at the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control and mentioned the importance of developing human resources for health care. He explained, through the use of graphs, that the increase in TB cases detected in Indonesia has been proportional to the increase in the number of people who received TB training (i.e., the existence of correlation), and added to say that at least 32 people in Indonesia had participated in the International Training Courses on Tuberculosis Control since its first course and that many of them were still working in TB-related areas.
- Asma El Sony (former trainee, Director of the Sudan Epidemiology Institute): She received the 19th Princess Chichibu Global Memorial TB Award at the 47th Union World Global Conference on Lung Health held in Liverpool, the UK, in 2016, for her hard work as the head of Sudan's TB control program and her contributions to the advancement of TB control in Sudan, including the dissemination of DOTS around the country except for disputed areas and the declaration of "DOTS is over" in 2002.

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<sup>20</sup> [https://www.jica.go.jp/english/our\\_work/types\\_of\\_assistance/tech/acceptance/training/forum/forum01.html](https://www.jica.go.jp/english/our_work/types_of_assistance/tech/acceptance/training/forum/forum01.html)

<sup>21</sup> Title at the time of the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control (held in 2012)

<sup>22</sup> Held on July 26, 2012

<sup>23</sup> Title at the time of the Ceremony/Symposium for the 50th Anniversary of International Training Courses on Tuberculosis Control (held in 2012)

Noteworthy output 11. Healthcare workers with enhanced capabilities to conduct surveys in line with the provisions of the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Healthcare workers with enhanced capabilities to conduct surveys in line with the provisions of the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Human resources
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Volunteer project (forming the program with grant aid project, technical cooperation project, and senior volunteer project) Region: Oceania Approach to be taken (testing/research/early warning): Testing, early warning Infectious disease: Lymphatic Filariasis
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	In implementing filariasis control, which was a common priority for Western Pacific countries, it was important to develop local human resources who could continue survey activity to contribute to future Filariasis control.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	In the project area, under the guidance of WHO/PacELF, the infectious disease team staff of the Ministry of Health, and healthcare workers of medical facilities are involved in the project implementation. Human resources developed in the program are continuously being utilized even after the program finished.
6. Main user	Identify users of the noteworthy output	Ministries of Health in 14 target countries, implementers of the health policy based on PacELF
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Lymphatic Filariasis patients in need of appropriate treatment and their families
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Of the four essential surveys about anthelmintic administration by mass drug administration (MDA) for Filariasis control, "C survey" to monitor during and after the implementation of the control program was appropriately conducted.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	In connection with this project, Eisai Co., Ltd. (Japan) provided anthelmintic agent free of charge, which was published in national newspapers of the countries in Oceania.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well	During the 12 years from 2004 to 2015, JICA dispatched a total of 26 JOCV members to six countries: Samoa, Tonga, Vanuatu, Fiji, Kiribati, and

	as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	PNG. By 2008, JICA provided anthelmintic agents and test kits to the following 14 countries. 1) Cook Islands, 2) Micronesia, 3) Fiji, 4) Kiribati, 5) Marshall Islands, 6) Nauru, 7) Niue, 8) Palau, 9) Papua New Guinea, 10) Samoa, 11) Solomon Islands, 12) Tonga, 13) Tuvalu, 14) Vanuatu. In the related project, "Project for Elimination of Lymphatic Filariasis" (2018-2023), the trained C/P agent staff are utilized to support Filariasis control.
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	Implementation of C survey activity* that contributes to Filariasis control  *A survey for measuring the impact at the end of MDA. It includes a survey to check if the disease rate of Filariasis is 1% or less in all MDA target countries.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	There is a following point to note in the production of the noteworthy output. When JICA and other donors' infectious disease control programs exist and grassroots service is promoted by JOCV, experts who provide technical guidance to JOCV are required. If possible, a senior volunteer should be the leader of a JOCV team with several members.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	Ex-Ante Evaluation form of Project for Elimination of Lymphatic Filariasis <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2018_1700405_1_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2018_1700405_1_s.pdf</a>  website (including project news) of Project for Elimination of Lymphatic Filariasis <a href="https://www.jica.go.jp/project/all_oceania/004/index.html">https://www.jica.go.jp/project/all_oceania/004/index.html</a>  Survey report of Infectious Disease Control with provision of machinery and equipment in the Pacific Region <a href="https://openjicareport.jica.go.jp/pdf/11926011_01.pdf">https://openjicareport.jica.go.jp/pdf/11926011_01.pdf</a>

## 2) Project Outline

<b>Case (project) name</b>	
(Volunteer project) Support for Elimination of Lymphatic Filariasis: 14 Pacific countries in Oceania (2004-2015)	
<b>Background of case implementation</b>	
With the aim of "eliminating Filariasis in the Western Oceania region by 2010," 22 countries in the area participated in the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF) starting in 2000. In response to this, JICA started dispatching JOCV members in 2001, and during the 12 years from 2004 to 2015, a total of 26 JOCV members were dispatched to six countries: Samoa, Tonga, Vanuatu, Fiji, Kiribati, and PNG.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal/Project Purpose: Since this is not an independent project, there is no PDM, and no clear Overall Goal and Project Purpose were set. However, in the "Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)" supported by the activities, the goal was set as "eliminating Filariasis in the Western Oceania region by 2010."
Outputs	Although no clear output goal was set, the following outputs were expected. ① "Appropriate implementation of C survey <sup>24</sup> in 5 countries" through human resource development with JOCV's contribution (activities below) ② "Smooth implementation of distribution of anthelmintic agents and test kits provided by JICA" with the contribution of JOCV
Activities	The activities of JOCV are diversified, but the main activity items are as follows. ① Support for monitoring survey about Filariasis control (C survey among 4 types of surveys) ② Providing OJT guidance about the skills (how to fill out the medication record book, appropriate drug application, PC skill, etc.) that were essential for healthcare workers to monitor Filariasis control ③ Educational activities in schools and communities ④ Distribution schedule/implementation support of insecticide treated net <sup>25</sup>
Implementation period	Ongoing from 2002 to present in 2021
Implementing agencies (Recipient country side)	Ministry of Health in Samoa, Tonga, Vanuatu, Fiji, Kiribati, and PNG, PacELF, WHO
Direct beneficiary	Healthcare workers implementing Filariasis control in each country
Cooperating Japanese agency (person)	Dr. Kazuyo Ichimori, expert on PacELF
Participating Japanese experts	Two to three dispatched experts are usually participating in the related project "Project for Elimination of Lymphatic Filariasis" (2018-2023).
<b>Case evaluation results (summary)</b>	
There are no clear evaluation results regarding the dispatch of JOCV.	
<b>Major noteworthy output produced in this case</b>	
Healthcare workers with enhanced capabilities to conduct surveys in line with the provisions of the Pacific Programme to Eliminate Lymphatic Filariasis (PacELF)	
<b>The process by which the noteworthy output concerned was produced</b>	
With an accumulation of the activities of JOCV members who have been dispatched to various countries since 2000, their experience of supporting Filariasis control in each country has been accumulated and human resources have been developed as well. Newly dispatched JOCV members provided C/P with OJT early in the dispatch period, through studying activity reports of senior members, receiving post-dispatch PacELF trainings (including lectures by Dr. Ichimori), and sharing information by participating in regular meetings among members of the same profession in the dispatched country and neighboring countries. Moreover, experience sharing has been progressing in line with the changing times, and experience of COVID-19	

<sup>24</sup> A study for measuring the impact at the end of MDA. It includes a survey to check if the disease rate of Filariasis is 1% or less in all MDA target countries.

<sup>25</sup> A mosquito net made of fibers kneaded with a long-lasting residual effectiveness of an insecticide. It has the effect of cutting off propagation by killing mosquitoes carrying malaria parasites before they propagate to others.

infection prevention and hygiene education is now being accumulated. (From a member's activity reports)

**Process by which the noteworthy output was used**

Health ministry officials who conducted monitoring surveys<sup>26</sup> for Filariasis control have strengthened their capabilities by acting with JOCV. They have utilized the acquired skills and continuously conducted appropriate monitoring surveys. (From project news)

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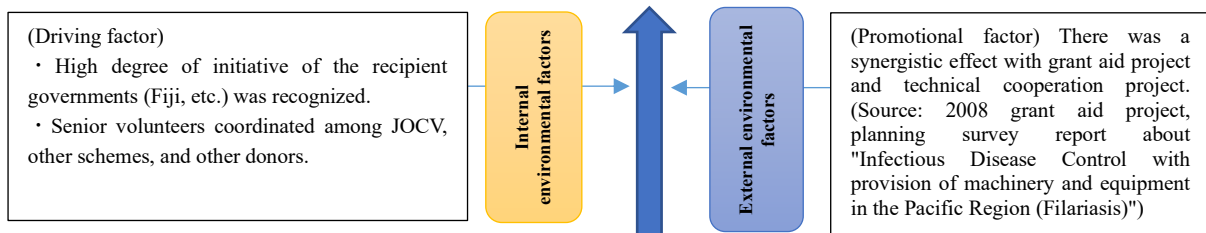
<sup>26</sup> C survey to monitor the impact of MDA and evaluation survey about propagation of Filariasis

### 3) Logic Model

**Goal: "Eliminate Filariasis in the Western Oceania region by 2010"** (Note: WHO/PacELF say it will recognize the spread of Filariasis as eliminated when MDA coverage rate has reached 80% or more, and the number of Lymphatic Filariasis-positive persons falls below 1%.)

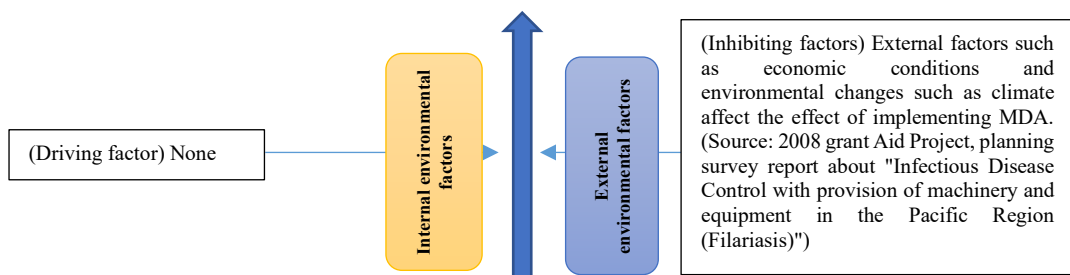
(Performance) **Almost achieved.** By 2008, when JOCV was active, 4 out of 14 countries\*<sup>1</sup> supported by JICA (Cook Islands, Niue, Tonga, Vanuatu) had almost reached the above standards, and in 4 other countries (Fiji, Kiribati, Samoa, and Tuvalu), the positive rate has declined significantly. However, PNG, where the implementation of the project was delayed, showed a high positive rate of 30% or more, and continuous Filariasis control has been needed.

As of September 2018, eight countries, Cook Islands, Solomon Islands, Tonga, Nauru, Niue, Vanuatu, Marshall Islands, and Palau, were cited as eliminated. Japan's grant aid project, technical cooperation, and JOCV's contributions to these countries are highly evaluated. (Source: 2018 Preliminary Survey Report on "Project for Elimination of Lymphatic Filariasis in the Pacific Region").



**Output level: "C survey was properly implemented in 5 countries"** due to the contribution of JOCV (activities below). (Achievements: **The existence of noteworthy output and the role of JOCV have been recognized in all the countries.**)

- Capacity development of local personnel was promoted to implement the survey in accordance with the provisions of PacELF through collaboration between dispatched experts and JOCV. JOCV in particular contributed to improving the quality of the C survey.
- WHO/PacELF office in Fiji collectively manages the anthelmintic agents and test kits provided by JICA by catalog, and transports them by air to each country according to their program implementation schedules. Some of the JOCV members provided logistical support to facilitate the transportation. As a result, a logistic service base for anthelmintic agents and test kits was established. In Fiji, the Division of Filariasis Control was established for the first time in Oceanian countries, focusing on Filariasis.



**Activity level:** JOCV activities are diversified, but the main role of JOCV is to support the C survey as well as providing C/P with OJT guidance about the skills that were essential for monitoring Filariasis control, such as recording in the medication record book, appropriate drug application, and PC skills. Their roles also include educational activities in schools and communities, planning the distribution of insecticide treated net, and providing the implementation support.

\* 1. Target countries for providing anthelmintic agents and test kits by JICA: (1) Cook Islands, (2) Micronesia, (3) Fiji, (4) Kiribati, (5) Marshall Islands, (6) Nauru, (7) Niue, (8) Palau, (9) Papua New Guinea, (10) Samoa, (11) Solomon Islands, (12) Tonga, (13) Tuvalu, (14) Vanuatu

## Noteworthy output 12. Biosafety level 3 (BSL-3) laboratory

### 1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Biosafety level 3 (BSL-3) laboratory <sup>27</sup>
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Infrastructure
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Grant aid Region: Africa Approach to be taken (testing/research/early warning): Testing and research Infectious diseases: HIV/AIDS, and multidrug-resistant Tuberculosis (TB) <sup>28</sup>
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	The laboratory was established as the first containment (BSL-3) laboratory in Ghana. The laboratory has since made it possible to safely control Risk Group 3 pathogens <sup>29</sup> such as TB, HIV, avian influenza, and viral hemorrhagic fever and to efficiently conduct research with these pathogens. The BSL-3 laboratory established at the Noguchi Memorial Institute for Medical Research dramatically enhanced its research infrastructure for research, testing, and diagnosis, and helped the Institute grow into a leading medical research institute in Africa. The Institute's highly upgraded research infrastructure has led to a significant increase in joint research projects with Western and African research institutes compared with before the Project, creating not only one-off research findings, but also information networks that remain in place after joint projects. As a result of the favorable cycle above, an increasing number of academic papers have been published by the Institute, raising its credibility and visibility and thus leading to other joint research projects.
5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	The BSL-3 laboratory, which was established in 1999, serves as the reference laboratory for Ghana's national TB control programs, and helps monitor patients' resistance to anti-TB and anti-AIDS drugs. The laboratory is also used for the surveillance of viral hemorrhagic fever, etc., and the testing of COVID-19

<sup>27</sup> There are four biosafety levels for laboratories: BSL-1 (basic); BSL-2 (basic); BSL-3 (containment); and BSL-4 (maximum containment).

<sup>28</sup> A type of TB that is resistant to isoniazid and rifampicin, the most effective drugs against the tubercle bacilli.

<sup>29</sup> Risk Group 3 pathogens refer to infectious microorganisms that represent a high risk to an individual and a low risk to the community. The pathogens typically cause serious human or animal disease, but do not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available.



		and Lassa fever specimens collected (with the WHO) from patients in West African countries. The laboratory also serves as a training facility for researchers specializing in infectious diseases in neighboring countries.
6. Main user	Identify users of the noteworthy output	Researchers and laboratory technicians working at the Noguchi Memorial Institute for Medical Research
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Patients with AIDS, TB, and other infectious diseases
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	In Ghana back then, there was no laboratory or equipment for safely and efficiently handling Risk Group 3 pathogens. The noteworthy output enabled safe handling Risk Group 3 pathogens and efficient laboratory work.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	As a research and diagnostic hub for infectious diseases, the Noguchi Memorial Institute for Medical Research is well-known among those who are involved in higher education and intellectuals beyond those who are in the country's health sector. The name of the Institute, bearing the family name of Dr. Noguchi, not only helps raise the visibility of the Institute, but also reminds people in Ghana of the support that the country has received from Japan and its friendship with Japan. It would also be safe to assume that name recognition of the Institute has expanded to some extent among the country's general public, considering the fact that a memorial stamp was issued in 1996 to commemorate the 120th anniversary of the birth of Dr. Noguchi. Many people, by the way, were invited to the Institute when it celebrated the 40th anniversary in 2019, and the ceremony was covered by media outlets.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Name of the project that produced the noteworthy output: The Project for Improvement of Noguchi Memorial Institute for Medical Research (the first term) Cooperation period: January 1998–March 1999 Related businesses: Medical Research Project at NMIMR (Phase 1 and 2) (1986–97); The Project for Improvement of Noguchi Memorial Institute for Medical Research (the second term) (October 1998); Infectious Diseases Project at NMIMR (January 1999 – December 2003); West African Centre for International Parasite Control Project (January 2004 – December 2008); Studies of Anti-viral and Anti-parasitic Compounds from Selected Ghanaian Medicinal Plants (April 2010 – March 2015); and The Project for the Construction of Advanced Research Center for Infectious Diseases at Noguchi Memorial Institute for Medical Research (May 2016 – May 2021)

11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The BSL-3 laboratory is designed for experiments that carry the high risk of aerosol generation of a Risk Group 3 pathogen, which are pathogenic viruses or bacteria that need to be contained, and a large volume or concentration of a Risk Group 2 pathogen. Features of the BSL-3 laboratory can be better used in special diagnostic testing or research on multidrug-resistant TB, etc., than are used in medical care practices for more common infectious diseases.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	The long-term use of a BSL-3 laboratory inevitably requires a setting to properly maintain and manage the equipment and instruments installed therein and to prevent their defects or malfunctions.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>Ex-post Evaluation Report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2006_9715100_4_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2006_9715100_4_s.pdf</a></p> <p>Ex-post Evaluation Report on the project level of a Grant Aid Project in Ghana  <a href="https://dl.ndl.go.jp/info:ndljp/pid/4023499">https://dl.ndl.go.jp/info:ndljp/pid/4023499</a></p>

2) Project outline

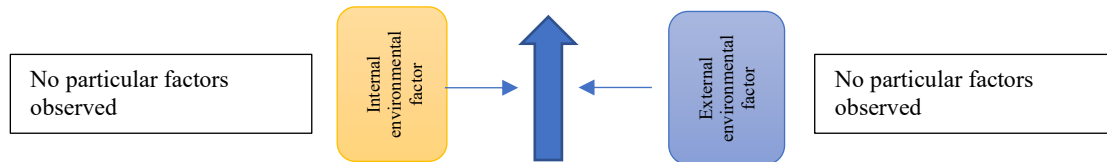
<b>Case (project) name</b>	
(Grant aid) The Project for Improvement of Noguchi Memorial Institute for Medical Research	
<b>Background of case implementation</b>	
The Noguchi Memorial Institute for Medical Research was constructed in Ghana in 1979 through Japan's grant aid. To respond to requests in and outside Ghana, however, the Institute was shifting its research focus from basic medicine to the areas of virology and immunology, areas in which high-risk pathogens are handled. Then, it evolved into a reference laboratory of WHO, UNICEF, USAID, DANIDA, etc. as the country's only research laboratory for basic medicine. The project was conducted with the following objectives: securing the safety of researchers working to control AIDS and TB; enhancing the functions of the Institute's laboratory to prevent biological contamination from spreading to the surrounding area; and making facility improvements to help the Institute advance its overall research activities.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Securing the safety of researchers working to control AIDS and TB; enhancing the functions of the Institute's facility to prevent biological contamination from spreading to the surroundings; and making facility improvements to help the Institute advance its overall research activities.
Outputs	1. A BSL-3 laboratory, an animal testing facility, a conference hall, and an office building are constructed, and the Institute's old laboratory is renovated. 2. Necessary equipment is provided to the above-mentioned facilities.
Activities	A series of activities relevant to each of the aforementioned outputs.
Implementation period	January 1998–March 1999
Implementing agencies (Recipient country side)	the Education Ministry of Ghana, and the Noguchi Memorial Institute for Medical Research
Direct beneficiary	Mostly patients with AIDS and TB
Cooperating Japanese agency	JICA
Participating Japanese experts	none
<b>Case evaluation results (summary)</b>	
The Project Purpose was achieved, with a huge impact. (Source: Ex-post Evaluation) Compared with the time before the Project, an increased number of joint research projects have been conducted between the Institute and Western and other African research institutes. Such joint research projects have created not only one-off research findings, but also information networks that remain in place after joint projects. As a result of the favorable cycle above, an increasing number of academic papers have been published by the Institute, raising its credibility and visibility and thus leading to other joint research projects. The BSL-3 laboratory building constructed through the Project dramatically enhanced the Institute's infrastructure, turning it into a leading medical research institute in Africa.	
<b>Major noteworthy output produced in this case</b>	
Biosafety level 3 (BSL-3) laboratory	
<b>The process by which the noteworthy output concerned was produced</b>	
Construction of BSL-3 laboratory and provision of equipment to the facility	
<b>Process by which the noteworthy output was used</b>	
The facility and equipment provided as the first BSL-3 laboratory in Ghana have since been used to safely manage the Risk Group 3 pathogens (such as TB, HIV, avian influenza, and viral hemorrhagic fever) and efficiently perform experiments with such pathogens.	

### 3) Logic model

**Overall Goal (Impact):** Disseminating the Institute’s activities outward and thereby establishing networks to share information and measures against infectious diseases.

Degree of achievement: **The Overall Goal was achieved, with a huge Impact** (Source: Ex-post Evaluation)

Compared with the time before the Project, an increased number of joint research projects have been conducted between the Institute and Western and other African research institutes. Such joint research projects have created not only one-off research findings, but also information networks that remain in place after joint projects. As a result of the favorable cycle above, an increasing number of academic papers have been published by the Institute, raising its credibility and visibility and thus leading to other joint research projects.



**Project Purpose (Outcome):** Securing the safety of researchers working to control AIDS and TB; enhancing the functions of the laboratory to prevent biological contamination from spreading to the surroundings; and making facility improvements to help the Institute advance its overall research activities.

Degree of achievement: **Achieved** (Source: Ex-post Evaluation)

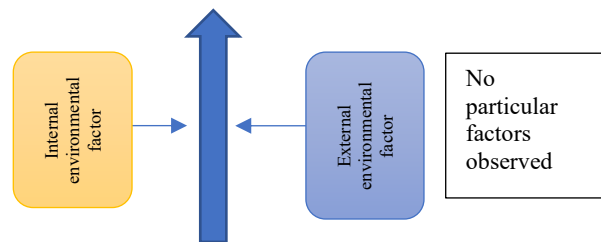
The installation of the BSL-3 laboratory as well as that of an animal testing facility, conference hall, and office building, the renovation of the Institute’s old laboratory, and the provision of equipment and instruments for all those facilities raised the safety and efficiency of experiments conducted at the Institute. The Institute has held more than 50 seminars or symposiums of around 120 people each year, and has also made the hall available to external organizations, helping their research activities. Consequently, all of the aforementioned have dramatically enhanced the Institute’s research infrastructure, making it one of the best in Africa.

**Sustainability of outcome: The Institute is at most times capable of sustaining the outcomes on its own, and hence it is safe to determine that the outcomes will be sustainable.** (Source: Ex-post Evaluation)

Policy and institutional aspect: Effective control of major infectious diseases is recognized as a priority in the Ghana Vision 2020, the country’s national development plan.

- Organizational aspect: There is no flexibility regarding the number of positions for researchers because of a limit in the budget from the government; however, there has so far been no negative impact on research activities.
- Technical aspect: It is very likely that the Institute’s research environment will remain in place thanks to its researchers who work with and learn from research findings and share information with researchers at overseas institutes. The Institute also has a certain level of capability to properly maintain and manage equipment on its own.
- Financial aspect: The Institute has a certain level of capability to manage finances on its own, considering the fact that the Institute appropriates 15% of joint research funds to its overhead costs.

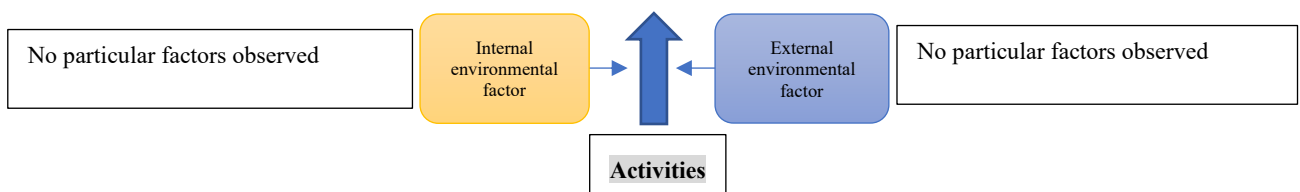
(Contributing factor) Collaboration with the technical cooperation project “Infectious Diseases Project at NMIMR” was carried out. In particular, the mention of “establishing a biosafety control system,” a matter closely related to the Project, in the Output section of the PDM for the technical cooperation project served as an effective driver.



**Output: All intended outputs were successfully produced.** (Source: Ex-post Evaluation)

1) A BSL-3 laboratory, an animal testing facility, a conference hall, and an office building are constructed, and the Institute’s old laboratory is renovated. 2) Necessary equipment is provided to the above-mentioned facilities.

**Noteworthy output: BSL-3 laboratory**



Noteworthy output 13. Hospitals, CDCs, and Emergency Care Centers with improved functions

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Hospitals, CDCs, and Emergency Care Centers with improved functions
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Organization
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: ODA loan Region: Asia Approach to be taken (testing/research/early warning): Testing Infectious disease: All infectious diseases
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	<p>The new type of pneumonia (Severe Acute Respiratory Syndrome: SARS) spread rapidly throughout China after the outbreak in November 2002 and caused 5,327 infections and 349 deaths. The spread of SARS revealed China's defective measures and vigilance against infectious diseases, poor communication networks, and the vulnerabilities of the country's public health infrastructure as typically observed in its underdeveloped and obsolete healthcare institutions. The Chinese government thus developed nationwide master plans afterwards, including the "Plan for Building a Disease Prevention and Control System" and the "Plan for Building an Emergency Care System to Respond to an Unexpected Outbreak of Public Health Events," and was seeking to establish a surveillance network, develop an emergency care system, and improve its settings for disease prevention and control.</p> <p>In particular, in the seven provinces covered by the Project, fewer or less effective public healthcare efforts were being made by the local governments than in other provinces, and hence the needs were high in those areas for the repair and expansion of public healthcare infrastructure and the improvement of knowledge and skills of those who were involved in measures against infectious diseases, included in the enhancement of the settings for disease prevention and public health control. The noteworthy output of the Project met those local needs.</p>
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	Hospitals: The equipment/facilities were being highly used and were useful at the time of the Ex-Post Evaluation; however, about ten years later now, the equipment/facilities for online operations, in particular, are run down. In fact, much of the equipment/facilities are now replaced with

		<p>new ones, except for some laboratory equipment.</p> <p>CDCs: The equipment/facilities procured through ODA loans were cutting-edge back then, and much of the equipment/facilities still remain in use at hospitals.</p> <p>Emergency Care Centers: Ambulances are still well-used. Negative-pressure ambulances, in particular, are indispensable in this time of the pandemic and are used to transfer patients infected with COVID-19 and those who have had close contact with someone infected with the virus.</p>
6. Main user	Identify users of the noteworthy output	Healthcare workers
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Local residents
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	As mentioned above, in the seven provinces covered by the Project, fewer or less effective public healthcare efforts were being made by the local governments than in other provinces, and hence the needs were high in those areas for the repair and expansion of public healthcare infrastructure and the improvement of knowledge and skills of those who were involved in measures against infectious diseases, included in the enhancement of the settings for disease prevention and public health control. In addition, after the outbreak of SARS, the need to strengthen the public health system rose sharply, but there were insufficient quantities of testing equipment/facilities. Therefore, it was imperative to strengthen capacity for the implementation of these policies. The noteworthy output contributed to satisfying the above infrastructure needs.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	None in particular.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	<p>Project name from which noteworthy output was identified: Public Health Project</p> <p>Cooperation Period: March 2004–December 2010</p> <p>Related Projects: ODA loan “Follow-up Training on Public Health Project (in the provinces of Jiangxi and Heilongjiang in 2011)”</p>
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The infrastructure for the noteworthy output was introduced during the implementation period of the Project. As a result, the functions of the healthcare institutions were improved. The noteworthy output is used for various tasks of different facilities*

		*Details are shown in the “Table: Outline of activities” of 2) Project outline below.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	(Here the important point in producing the noteworthy output is stated.) It is important to promptly conduct the procurement of necessary equipment and facilities in producing the noteworthy output. During the Project, not often but sometimes, some provinces or cities took much time to go through the procedures with the national government and JICA, which resulted in significant delays especially in local procurement operations. Such delays affect the time in which the effect of a noteworthy output occurs.
13.Presentation of specific content	Add a link to the actual study reports/evaluation reports	• Link: (Ex-Post Evaluation) “ <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2012_C03-P182_4_f.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2012_C03-P182_4_f.pdf</a> ”

2) Project outline

<b>Case (project) name</b>											
(ODA loan) Public Health Project											
<b>Background of case implementation</b>											
<p>The incidence of reportable communicable diseases significantly decreased in China during and after the 1990s. However, the country's healthcare sector still had serious issues, such as the occurrence of HIV/AIDS and other infectious diseases and the high incidence rate of communicable diseases in rural regions due to poorer public health control. Under such circumstances, SARS broke out in November 2002, and it quickly spread across China, causing 5,327 infections and 349 deaths. The spread of SARS revealed China's defective measures and vigilance against infectious diseases, poor communication networks, and the vulnerabilities of the country's public health infrastructure as typically observed in its underdeveloped and obsolete healthcare institutions. The Chinese government therefore developed nationwide master plans afterwards, including the "Plan for Building a Disease Prevention and Control System" and the "Plan for Building an Emergency Care System to Respond to an Unexpected Outbreak of Public Health Events," and was seeking to establish a surveillance network, develop an emergency care system, and improve its settings for disease prevention and control.</p>											
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)											
Goals	<p>The Project is implemented in seven provinces* in China's inner region for the goal of improving the vulnerability of the public health control settings that was revealed in the SARS epidemic. By introducing equipment/facilities and developing human resources for healthcare services at core healthcare institutions of the provincial level and city level 3, the Project seeks to improve the measures against infectious diseases taken in those provinces and thus seek to improve the health of local residents.</p> <p>* Hunan, Jiangxi, Anhui, Shanxi, Jilin, Heilongjiang, and Liaoning</p>										
Activities	<p>The program consists of the provision of medical equipment/facilities for public healthcare institutions engaged in the prevention of diseases, testing, and treatment, and the provision of training programs for healthcare workers. The equipment/facilities to be introduced and the training programs to be conducted were planned separately for each province to meet its specific local needs.</p> <p style="text-align: center;">Table: Outline of activities</p> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 30%;">Target Healthcare Institutions</th> <th>Major functions of the institutions, and items provided for them</th> </tr> </thead> <tbody> <tr> <td>Centers for Disease Control and Prevention (CDCs) 91 centers in seven provinces</td> <td> <ol style="list-style-type: none"> <li>Functions: A CDC is a public administration agency serving as a public health center and healthcare research institute. Major tasks include the prevention and control of the ten leading diseases, immunization, and supervision of food sanitation.</li> <li>Items provided: Specimen analyzing devices of various kinds, information equipment, emergency examination/treatment vehicles, etc.</li> </ol> </td> </tr> <tr> <td>Infectious disease hospitals 85 hospitals in seven provinces</td> <td> <ol style="list-style-type: none"> <li>Functions: Treatment and testing for patients with infectious and other diseases</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, beds, etc.</li> </ol> </td> </tr> <tr> <td>Emergency care centers 19 centers in five provinces</td> <td> <ol style="list-style-type: none"> <li>Functions: Handling emergently-transferred patients and providing emergent treatment for them</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, etc.</li> </ol> </td> </tr> <tr> <td>Training programs for human resource development</td> <td> <ol style="list-style-type: none"> <li>Items provided: Dispatching of personnel involved in measures against infectious diseases to administrative authorities of upper levels, dispatching and training such personnel (except those in Jilin) in Japan, and inviting experts from Beijing and Shanghai to the provinces</li> </ol> </td> </tr> </tbody> </table>	Target Healthcare Institutions	Major functions of the institutions, and items provided for them	Centers for Disease Control and Prevention (CDCs) 91 centers in seven provinces	<ol style="list-style-type: none"> <li>Functions: A CDC is a public administration agency serving as a public health center and healthcare research institute. Major tasks include the prevention and control of the ten leading diseases, immunization, and supervision of food sanitation.</li> <li>Items provided: Specimen analyzing devices of various kinds, information equipment, emergency examination/treatment vehicles, etc.</li> </ol>	Infectious disease hospitals 85 hospitals in seven provinces	<ol style="list-style-type: none"> <li>Functions: Treatment and testing for patients with infectious and other diseases</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, beds, etc.</li> </ol>	Emergency care centers 19 centers in five provinces	<ol style="list-style-type: none"> <li>Functions: Handling emergently-transferred patients and providing emergent treatment for them</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, etc.</li> </ol>	Training programs for human resource development	<ol style="list-style-type: none"> <li>Items provided: Dispatching of personnel involved in measures against infectious diseases to administrative authorities of upper levels, dispatching and training such personnel (except those in Jilin) in Japan, and inviting experts from Beijing and Shanghai to the provinces</li> </ol>
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Centers for Disease Control and Prevention (CDCs) 91 centers in seven provinces	<ol style="list-style-type: none"> <li>Functions: A CDC is a public administration agency serving as a public health center and healthcare research institute. Major tasks include the prevention and control of the ten leading diseases, immunization, and supervision of food sanitation.</li> <li>Items provided: Specimen analyzing devices of various kinds, information equipment, emergency examination/treatment vehicles, etc.</li> </ol>										
Infectious disease hospitals 85 hospitals in seven provinces	<ol style="list-style-type: none"> <li>Functions: Treatment and testing for patients with infectious and other diseases</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, beds, etc.</li> </ol>										
Emergency care centers 19 centers in five provinces	<ol style="list-style-type: none"> <li>Functions: Handling emergently-transferred patients and providing emergent treatment for them</li> <li>Items provided: Diagnostic equipment, sterilization and treatment equipment, ambulances, etc.</li> </ol>										
Training programs for human resource development	<ol style="list-style-type: none"> <li>Items provided: Dispatching of personnel involved in measures against infectious diseases to administrative authorities of upper levels, dispatching and training such personnel (except those in Jilin) in Japan, and inviting experts from Beijing and Shanghai to the provinces</li> </ol>										
Implementation period	March 2004–December 2010										



Implementing agencies (Recipient country side)	(1) Hunan Provincial People's Government (Health Department); (2) Jiangxi Provincial People's Government (Health Department); (3) Anhui Provincial People's Government (Finance Department); (4) Shanxi Provincial People's Government (Finance Department); (5) Jilin Provincial People's Government (Health Department); (6) Heilongjiang Provincial People's Government (Health Department); and (7) Liaoning Provincial People's Government (Health Department)
Direct beneficiary	People involved in measures against infectious diseases, and healthcare workers
Participating Japanese experts	None

### Case evaluation results (summary)

The Project was evaluated as highly satisfactory in the Ex-Post Evaluation. High relevance can be found in the plan and design of the Project. More specifically, the Project provided necessary equipment/facilities in a timely manner, and the Project fit with the Chinese government's policies and its needs in those days for enhancing public healthcare settings. The appropriate planning done for the Project enabled it to successfully improve the capabilities to prevent, test for, and treat diseases at core public healthcare settings, i.e., CDCs, infectious disease hospitals, and emergency care centers. In other words, effectiveness of the Project is high. The effect of the Project can be seen in China's better response to new types of influenza, etc. that broke out after the Project. Except for the human resource development training, the Project was completed within the schedule. The total cost did not exceed the budget. Thus, the efficiency of the Project is fair. Much of the equipment/facilities introduced through the Project were managed and used properly at the time of the ex-post evaluation. It would also be safe to judge that there would be no occurrence of organizational or financial issues in the future, considering the Chinese government's stance on reinforcing its public healthcare settings.

### Major noteworthy output produced in this case

Hospitals, CDCs, and emergency care centers with improved functions

### The process by which the noteworthy output concerned was produced

The functions at each of the noteworthy outputs were by and large improved through the procurement of necessary equipment/facilities. The Project had target areas of as many as ten provinces across China (seven of them were subject to the Ex-Post Evaluation), as well as a significant number of target institutions. The Project was planned with particular attention to the unity of the entire Project and the efficiency of procurement.

1. Firstly, a list of equipment/facilities necessary to meet the testing standards required by China's communicable disease prevention law, etc. was made for each target healthcare institution, and then a list of minimum-essential equipment/facilities and another list of desirable equipment/facilities were made.
2. Based on those lists, each of the target healthcare institutions bought equipment/facilities necessary to meet the local needs, etc. within the budget allocated to each institution.
3. The detailed specs and models of equipment/facilities were chosen with the solo authority of each Health Department. JICA was involved only in the processes of checking whether the equipment/facilities to be bought by the healthcare institution were included in the procurement list and approving of the purchase to be made.

### Process by which the noteworthy output was used

- a. Hospitals with improved functions: The Project purchased equipment/facilities, including surgical tables, to improve the capabilities of the hospitals to test for and treat infectious diseases. Improvement in indicators, such as "in-hospital mortality rate," "in-house infection rate," and "complete cure rate and disease improvement rate per treatment case," has been reported. It may be too extreme to attribute all those improvements to the Project, but it would be safe to assume that the Project has contributed to those improvements to some extent, considering that the equipment/facilities introduced through the Project are important for enhancing the afore-mentioned hospital capabilities.
- b. CDCs with improved functions: The roles of CDCs include testing for infectious diseases, and activities to raise the awareness about infectious diseases among residents. The improved settings for testing infectious diseases have enabled the CDCs to detect and respond to the occurrence of infectious diseases at earlier stages compared to the pre-SARS time.
- c. Emergency care centers with improved functions: Improvement in the capabilities of the emergency care centers was clearly recognized after the Project, as was seen in "the higher allocation of ambulances to emergency calls" and "significantly-increased emergency transfers in all of the provinces." In addition to the quantity improvement, the enhancement of defibrillators<sup>30</sup> and other emergency care devices procured through the Project has brought about improvement in the quality of emergency transfer.

<sup>30</sup> Device used to treat arrhythmia; it is mainly used to restore atrial fibrillation and ventricular fibrillation to normal.

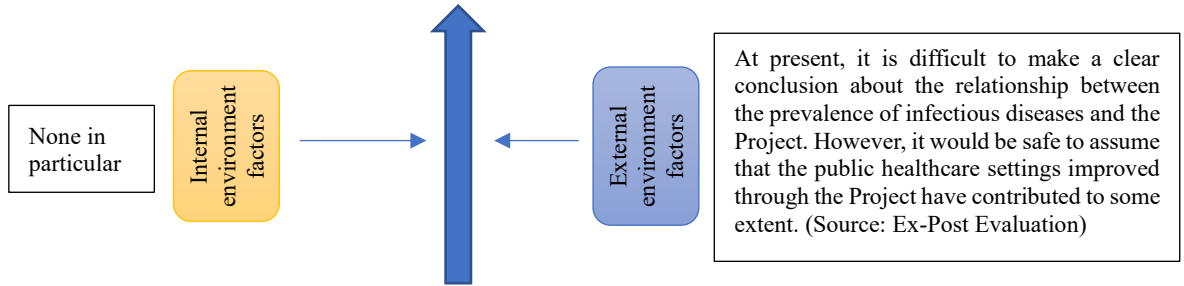
### 3) Logic model

**Impact:**

Improving the health of local residents.

Note: The ultimate goal and expected impact of the Project was to “improve the health of local residents,” or more specifically, to “reduce the morbidity and mortality of infectious diseases.”

Performance: There has been no large-scale outbreak of infectious diseases since the late 2000s when the Project took place, and the mortality of infectious diseases has been on a slightly decreasing trend. (Source: Ex-Post Evaluation)



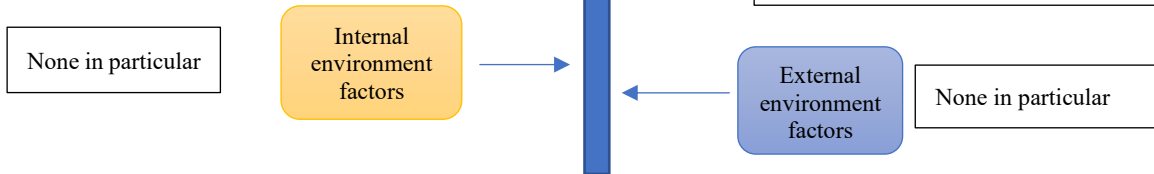
**Project Purpose (Outcome):** Comprehensive enhancement of public healthcare settings was expected as the outcomes of improving the functions to prevent (CDCs) and provide treatment (infectious disease hospitals), and transfer patients (emergency care centers) at each of the target institutions of the Project in seven provinces in China’s inner region.

Performance: **Highly achieved**, as described below. (Source: Ex-Post Evaluation)

- (1) Improvement in overall functions: According to the two provincial governments that responded to a question about their readiness for an unexpected prevalence of infectious diseases, the time until the first response to the occurrence of a Class-B infectious disease has been made significantly shorter than the specified time.
- (2) Improvement in CDC functions: The CDCs’ testing capabilities (i.e., the number of testing items, time spent for testing, etc.) have been improved quantitatively and qualitatively.
- (3) Improvement in hospital functions: It has been indicated in the improved in-house mortality and in-house infection rates.
- (4) Improvement in emergency care center functions: There is a clear indication that improvement has been made.

**Sustainability of the Outcome:** The sustainability of the outcomes achieved through the Project is high, considering that no major problems have been observed in the organizational, technical, and financial aspects. (Source: Ex-Post Evaluation) More accurately, the financial aspect or current status of the maintenance of the CDCs, hospitals, etc. varies slightly from institution to institution. In fact, some of the institutions have not yet attained a satisfactory status at the local level. However, the current situation does not raise significant concerns about the level of finance and maintenance to maintain the functioning of the public healthcare settings as a whole, and it is unlikely that the capacity of the public healthcare settings will deteriorate in the future, as the Chinese government is placing emphasis on public healthcare policies.

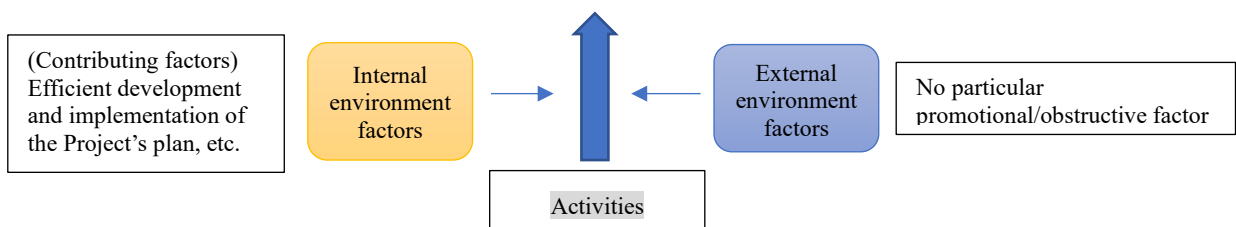
In the project Hospitals, CDCs, and emergency care centers with improved functions are the candidates of noteworthy output. Moreover, the development of the online network system on infectious disease linking the national government to the prefectural government has made it possible to strengthen and speed up the notification system in the event of an outbreak of infectious diseases.



**Output:** The following equipment/facilities were introduced through the Project.

- (1) For improvement of overall functions: Telecommunication and multimedia equipment
- (2) For improvement of CDC functions: Testing devices and equipment, facilities for exclusive use as laboratories, materials for healthcare education, communication facilities, vehicles, and cold chain equipment/facilities
- (3) For improvement of hospital functions: Testing devices/equipment, and treatment-related devices/equipment such as surgical tables
- (4) For improvement of emergency care center functions: Ambulances (to increase the number thereof) and negative-pressure ambulances (to introduce the vehicle)

The Project also provided training programs for those who were involved in public healthcare measures, with training programs in Japan, Beijing, Shanghai, etc., and invited specialists to the provinces as training lecturers.



Noteworthy Output 14. Rapid diagnostic kits for Ebola virus disease

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Rapid diagnostic kits for Ebola virus disease
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Technology
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: SATREPS (Science and Technology Research Partnership for Sustainable Development) Region: Africa Approach to be taken (testing/research/early warning): Testing Infectious disease: Ebola Virus Disease
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	For infectious disease control, rapid screening of suspected cases is important. In Africa, there are only a limited number of laboratories that can carry out diagnostic tests based on highly sensitive gene detection. Accessing these facilities is a challenge, and it takes time the results to be notified. Therefore, there was a problem of delay in treatment of patients waiting for the results. In addition, the diagnostic method based on gene detection requires power to store test reagents and the testing equipment itself. In areas where power supply is limited, it is necessary to transport specimens to urban areas, and it takes time to get the diagnostic results. While waiting for the results, the infectious disease may spread. On the other hand, the "Ebola rapid diagnostic kit" does not require any laboratory or testing equipment, can be stored at room temperature, and can produce results rapidly. Therefore, such kits are helpful for early detection, early treatment, and early containment of the infectious disease.
5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	It is used on a daily basis to diagnose suspected cases of Ebola Virus Disease in Zambia. It is highly likely that the University of Zambia will remain designated as a diagnostic institution for infectious diseases caused by highly pathogenic agents, including Ebola Virus Disease.
6. Main user	Identify users of the noteworthy output	Healthcare workers and researchers
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	People suspected to have Ebola Virus Disease

8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Reduction in time taken for diagnosis of Ebola Virus Disease. Improvement in the access to diagnosis of Ebola Virus Disease.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	<ul style="list-style-type: none"> <li>• The diagnostic kits was featured in the scientific journal Nature. Butler D. Speedy Ebola tests help contain Africa's latest outbreak. Nature 558(7709):172, 2018.</li> <li>• Dr. Katendi Changula, the University of Zambia, the counterpart, received Next Einstein Award in 2018.</li> <li>• In a TED talk, this doctor gave a presentation with the title "A new way to fight infectious diseases and predict outbreaks."</li> </ul>
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	<p>Name of the project from which the noteworthy output was identified: Project for Surveillance of Viral Zoonoses<sup>31</sup> in Africa Cooperation period: June 2013–May 2018</p> <p>Related project: Establishment of Rapid Diagnostic Tools for Tuberculosis and Trypanosomiasis and Screening of Candidate Compounds for Trypanosomiasis (November 2009–November 2013)</p>
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	As the kits can be stored at room temperature and are easy to manage, they can be kept in medical facilities at all times, and can be used for rapid testing and diagnosis when a person suspected of having Ebola Virus Disease is identified. In addition, since the noteworthy output does not require any laboratory facility or testing equipment, the lightweight and compact diagnostic kits, easy for healthcare workers to use, are highly useful in an epidemic as the Ministry of Health needs to rapidly deploy testing and diagnosis on a massive scale.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	(Below is the point to keep in mind when generating the noteworthy output.) The highly effective and useful diagnostic kits were developed through accurately understanding of local issues in the control of an Ebola epidemic, and technological innovation to address them. It is highly effective in the sense that it is a diagnostic kit with excellent testing accuracy and precision. Moreover, it is highly useful in the sense that it is a diagnostic kit that is easy to use even in places where there is no laboratory facility or testing equipment. It can be considered that the noteworthy output could not have been generated if any of the attributes was lacking, so it was important to identify

<sup>31</sup> Zoonoses are diseases transmissible from vertebrate animals, other than humans, to people.

		appropriate issues and solve the problems through technical cooperation.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>Ex-ante evaluation report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2013_1202444_1_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2013_1202444_1_s.pdf</a></p> <p>Mid-term review report  <a href="https://openjicareport.jica.go.jp/pdf/12254108.pdf">https://openjicareport.jica.go.jp/pdf/12254108.pdf</a>  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2015_1202444_2_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2015_1202444_2_s.pdf</a></p> <p>Terminal evaluation report  <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2017_1202444_3_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2017_1202444_3_s.pdf</a></p> <p>mundi December 2018 issue "Infectious disease control: Japanese technology saves lives"  <a href="https://www.jica.go.jp/publication/mundi/1812/index.htm">https://www.jica.go.jp/publication/mundi/1812/index.htm</a></p>

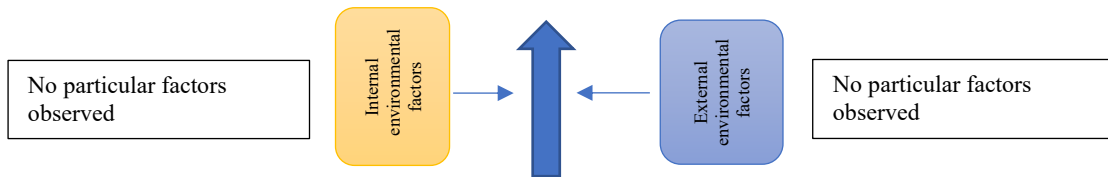
2) Project outline

<b>Case (project) name</b>	
(SATREPS) Project for Surveillance of Viral Zoonoses in Africa	
<b>Background of case implementation</b>	
<p>Zambia faces the threat of various viral infectious diseases. Social interest in the problem is high and it is emphasized as a policy priority. Nevertheless, at present, the educational and research bases for viral zoonoses have hardly been developed. In addition, the surveillance system as well as the test and diagnostic capabilities are weak. To effectively contain the domestic and international spread of infectious diseases, it is necessary to establish the test and diagnosis systems and to investigate the natural hosts and existence modes of pathogens. Moreover, there may be unknown or unidentified viruses in Africa. Therefore, in addition to accurate understanding of epidemiology of known viral infectious diseases, research for active surveillance of new viruses and for risk assessment of those as pathogens has also been highly needed from a perspective of preparedness for emerging and re-emerging infectious diseases not only in Zambia but also in neighboring countries.</p> <p>This project aims to disseminate the diagnostic methods and epidemiological knowledge of viral zoonoses, including hemorrhagic fever and influenza, which are an important issue in public health, by developing/improving diagnostic methods for viruses possessed by wild and domestic animals, clarifying the existence modes and propagation paths of the viruses, and assessing the risk of pathogens, in collaboration with the implementing agency of Zambia. At the same time, it aims to improve the capabilities of research and surveillance on viral zoonoses in Zambia by conducting joint research and establishing the research and educational systems in Zambia.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	The capabilities of comprehensive research and surveillance on viral zoonoses in Zambia improves through joint research between Zambian and Japanese research institutes.
Outputs	<ol style="list-style-type: none"> <li>1. Establishment of the research and educational systems on zoonoses in the School of Veterinary Medicine, the University of Zambia.</li> <li>2. Establishment and improvement of the diagnostic methods (viral gene detection method, virus-specific antibody detection method, and viral antigen detection method) for viral zoonoses such as influenza and viral hemorrhagic fever.</li> <li>3. Assessment of the risk of known and unknown viruses as pathogens, based on the information of genetic analysis, natural hosts, transmissions, host ranges, and pathogenicity.</li> </ol>
Activities	Activity groups corresponding to each of the above outputs
Implementation period	June 2013–May 2018
Implementing agencies (Recipient country side)	The School of Veterinary Medicine and the School of Medicine of the University of Zambia; the Ministry of Higher Education; the Ministry of Health; Zambia National Public Health Institute; the Teaching Hospital of the University of Zambia; the Ministry of Fisheries and Livestock; the Central Veterinary Research Institute; and the Department of National Parks and Wildlife, the Ministry of Tourism and Arts
Direct beneficiary	People suspected of having Ebola Virus Disease
Cooperating Japanese agency	Hokkaido University Research Center for Zoonosis Control, and the Japan Agency for Medical Research and Development (AMED)
Participating Japanese experts	Dispatch of 2 long-term experts and short-term experts
<b>Case evaluation results (summary)</b>	
<p>The Project Purpose was achieved to a greater degree than expected. Through the joint research, the research functions of the school of Veterinary Medicine, the University of Zambia, and the capabilities of researchers improved dramatically. As a result, 15 academic papers were published in international journals as of the time of terminal evaluation. The detection method developed in this project was applied to the laboratory diagnosis of viral infectious diseases, and laboratory diagnosis of Ebola Virus Disease was established in the School of Veterinary Medicine, the University of Zambia, to be also used for actual diagnosis. Consequently, the surveillance function on viral zoonoses in Zambia was enhanced.</p>	
<b>Major noteworthy output produced in this case</b>	
Rapid diagnostic kits for Ebola virus disease	

<b>The process by which the noteworthy output concerned was produced</b>
The output was produced by activities relevant to Output 2 of PDM.
<b>Process by which the noteworthy output was used</b>
In the 2013-2016 epidemic, the output contributed to the diagnostic work as the only institution with diagnostic technique for suspected cases of Ebola Virus Disease in Zambia. It is used on a daily basis to diagnose suspected cases of Ebola Virus Disease in Zambia. The Ebola rapid diagnostic kits are also used in the Democratic Republic of the Congo, an endemic area of the infectious disease.

### 3) Logic model

**Overall Goal (Impact):** "Formation of a core research and educational base for viral zoonoses in Southern Africa by disseminating diagnostic methods and epidemiological information and utilizing trained human resources to develop into collaborative research with research institutes in neighboring countries" (Note: The JICA evaluation report does not specify any Overall Goal. Provisionally the "JST Overall Goal" is written.)



**Project Purpose (Outcome):** "Improvement of the capabilities of comprehensive research and surveillance on viral zoonoses in Zambia through joint research between Zambian and Japanese research institutes."

**Degree of achievement: Achieved to a greater degree than expected** (Source: Terminal evaluation)

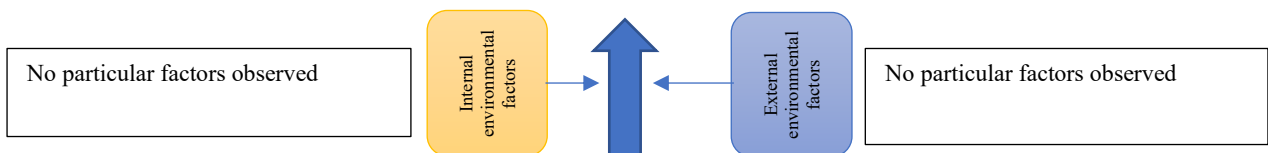
Through joint research, the research functions of the School of Veterinary Medicine, the University of Zambia, and the capabilities of researchers improved dramatically. As of the time of terminal evaluation, 15 academic papers were published in international journals. The detection method developed in this project was applied to the laboratory diagnosis of viral infectious diseases, and laboratory diagnosis of Ebola hemorrhagic fever was established in the School of Veterinary Medicine, the University of Zambia, to be also used for actual diagnosis. As a result, the surveillance function on viral zoonoses in Zambia was enhanced.

**Sustainability of the outcome:** "The project effect has been partially continuing" (Source: Terminal evaluation)

- Policy and institutional aspect: The policy importance of infectious disease control, livestock hygiene, and science and technology promotion is maintained. The School of Veterinary Medicine, the University of Zambia, which has the capabilities of examination, diagnosis, and research on viral infections, is recognized as an important partner of the Ministry of Health. It is suggested that the policy importance of maintaining and enhancing the research function of the School will continue to increase.
- Organizational aspect: Not clarified.

- Technical aspect: Zambian researchers have reached an almost self-reliant technical level through the joint research and training in Japan. A standardized experimental protocol and standard operating procedure (SOP) for examination and diagnostic methods were prepared. Laboratory operation and maintenance regulations were added, so the sustainability in technical terms can be expected to some extent.

- Financial aspect: The research capability and educational function improved through this project were evaluated and adopted in a World Bank project in 2015. As a result, the financial base of the School was secured to some extent.

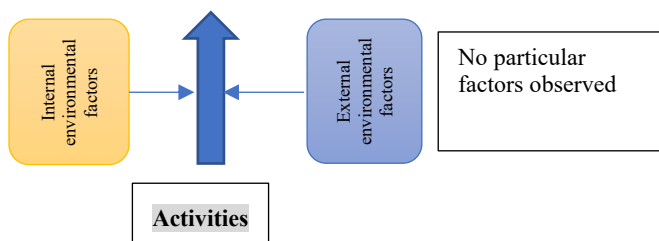


**Outputs: Output 1 was achieved. Outputs 2 and 3 were achieved to a greater degree than expected** (Source: Terminal evaluation)

1) Establishment of the research and educational systems on zoonoses in the School of Veterinary Medicine, the University of Zambia. 2) Establishment and improvement of the diagnostic methods (viral gene detection method, virus-specific antibody detection method, and viral antigen detection method) for viral zoonoses such as influenza and viral hemorrhagic fever. 3) Assessment of the risk of known and unknown (or unidentified) viruses as pathogens, based on the information of gene analysis, natural hosts, transmissions, host ranges, and pathogenicity.

**Noteworthy output: Rapid diagnostic kits for Ebola Virus Disease**

(Obstructive factors) The arrival of the project coordinators was delayed, and the start of full-scale research activities was also delayed. In the process of integrating the Zambia Wildlife Authority, which issues a permit for sampling of wild animals, into the Ministry of Tourism and Arts, it took more than half a year to obtain the permit.





Noteworthy output 15,16. “The Campinas University Hospital’s medical care manual including a rapid test method for fungal detection”; and “Procedure manual in Portuguese on the DNA microarray, LAMP method,  $\beta$ -glucan measurement, fungal susceptibility testing, and the real-time PCR method”

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	“The Campinas University Hospital’s medical care manual including a rapid test method for fungal detection” and “Procedure manual in Portuguese on the DNA microarray, <sup>32</sup> LAMP method, $\beta$ -glucan <sup>33</sup> measurement, fungal susceptibility testing, <sup>34</sup> and the real-time PCR method”
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Technology (Manual)
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: SATREPS Region: Latin America Approach to be taken (testing/research/early warning): Testing/research Infectious disease: Fungal infections
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Fungal infections, caused by yeast or mold, not only reduce the patient’s quality of life (QOL) but are often fatal. HIV infection, which impairs human immune function, is prone to cause a fungal infection. Measures against fungal infections are particularly important for Brazil because as many as 730,000 people in the country are HIV-positive. The findings about fungi and the rapid test method for fungal detection obtained in the Project were included in a hospital’s medical care manual (the noteworthy output), and the manual has since been used by hospitals, etc., for the diagnosis of fungal infections.
5. Current usage status of noteworthy output	Whether the effect/impact is continuing, whether sustainability is ensured, and consistency with the policy system of the recipient government	According to some people familiar with the matter, the manual is used by hospitals and research institutions.
6. Main user	Identify users of the noteworthy output	Staff working at hospitals and research institutions
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Patients with a fungal infection
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	The following two tasks were fulfilled during the period of the Project: (1) conducting an epidemiological analysis of all AIDS and other

<sup>32</sup> A DNA microarray (also called as DNA chip) is a substrate with tens to hundreds of thousands of divisions to which DNA partial sequences are arranged and immobilized at high density.

<sup>33</sup>  $\beta$ -glucan is a component that is abundant in mushrooms and has the effects of strengthening immunity and suppressing the rise in cholesterol levels.

<sup>34</sup> Susceptibility testing determines the vulnerability of a microorganism against an antimicrobial agent by exposing the former at a certain standard concentration level to the latter at several concentration levels. Susceptibility testing is performed against bacteria, fungi, and viruses.

		immunocompromised patients with a fungal infection in the State University of Campinas (Brazil) during the project period; and (2) transferring to the State University of Campinas techniques concerning the DNA chip, $\beta$ -glucan measurement, the real-time PCR method, and the LAMP method, and confirming the practicality of those techniques transferred.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	Although its name recognition is unknown, as mentioned earlier, the findings about fungi and the rapid test method for fungal detection obtained through the Project were included in the medical care manual of the implementing agency's attached hospital, and have been reportedly disseminated to other Portuguese-speaking countries and neighboring countries. Although it is outside the recipient country, the Project was featured in the Chiba Daily Newspaper, and the Project's output was reported to be "significantly contributing to the benefit of Brazil (according to the Terminal Evaluation Report)."
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which noteworthy output was identified: The Project for New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients Cooperation Period: April 2010–March 2013 Prior to the Project, the following projects were carried out by the same implementing agency: "The Project on Gastroenterological Diagnosis and Research Center of the State University of Campinas," a technical cooperation project for supporting medical education and research (July 1990–July 1996); and "Clinical Research and Medical Training Project of the State University of Campinas in Brazil," a technical cooperation project (April 1997–March 2002).  Moreover, the following project is underway as a sequel to the Project: "Project for the Establishment of a Research and Reference Collaborative System for the Diagnoses of Fungal Infections including Drug-Resistant Ones both in Brazil and Japan (SATREPS) " (Scheduled period: June 2017–June 2022).
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The noteworthy output can be utilized to disseminate and clinically use the techniques obtained through the Project since the completion of the technical development (= since the completion of the Manual) for measures against fungal infection in other countries.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	(Matters to consider to produce the noteworthy output in other countries/projects) The noteworthy output is believed to be applicable to measures against the fungal infection that will be taken in neighboring countries. As a basic matter, however, it is

		<p>important to remember that any gene-related experiments carry the risk of contaminating DNA samples. Problems due to careless handling tend to occur particularly in such experiments as those where a single PCR or other reagent is shared among multiple researchers. Therefore, (i) thorough guidance about basic procedures should be given to all members involved. In addition, (ii) there should be a rule in place concerning the sterilization of pipettes; and, especially in developing countries where the quality of water supplied is low or inconsistent, (iii) distilled water suitable for the purpose of use should be purchased for experiments because the quality of distilled water affects outcomes. Moreover, (iv) skills for handling cutting-edge instruments, procedures for experiments, and methods to analyze experiments should be transferred to full-time technical staff because in many developing countries it is often the case that such skills are not shared with others (especially when such skills are transferred to postgraduates). Furthermore, those who instruct gene-related experiments should (v) establish a setting that allows those who have received training to properly perform gene-related experiments on their own because the existence of such setting eliminates the necessity of analyzing samples in Japan and makes the task easier for short-term experts.</p>
13.Presentation of specific content	Add a link to the actual study reports/evaluation reports	<ul style="list-style-type: none"> <li>• Links:  (Terminal Evaluation Report)  <a href="https://www.jst.go.jp/global/hyouka/pdf/h2118_brazil_terminal-evaluation-report.pdf">https://www.jst.go.jp/global/hyouka/pdf/h2118_brazil_terminal-evaluation-report.pdf</a>  (Follow-up Evaluation Report)  <a href="https://www.jst.go.jp/global/hyouka/pdf/h2118_brazil_follow-up-evaluation-report.pdf">https://www.jst.go.jp/global/hyouka/pdf/h2118_brazil_follow-up-evaluation-report.pdf</a> </li> </ul>

## 2) Project outline

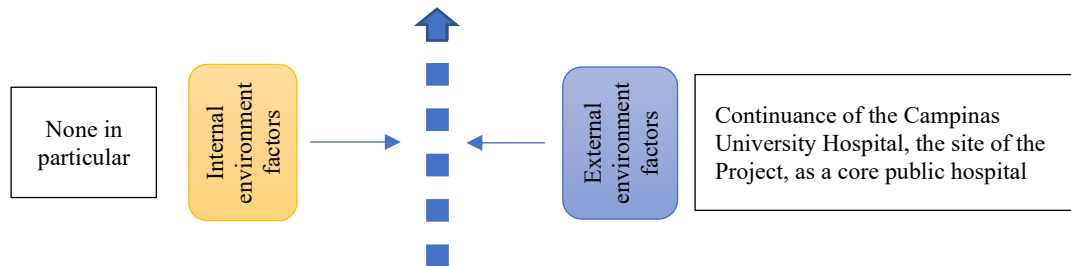
<b>Case (project) name</b>	
(SATREPS) The Project for New Diagnostic Approaches in the Management of Fungal Infections in AIDS and Other Immunocompromised Patients	
<b>Background of case implementation</b>	
Fungal infections, caused by yeast or mold, not only reduce the patient's quality of life (QOL) but are often fatal. HIV infection, which impairs human immune function, is prone to cause a fungal infection. Measures against fungal diseases are particularly important for Brazil because as many as 730,000 people in the country are HIV-positive. The Project, an initiative to fight against fungal infections, was conducted to carry out an epidemiological survey on fungal infections in Brazil, and jointly develop a rapid and simplified method to diagnose fungal infections and identify fungal species by using a DNA chip developed (for fungal species identification) by the Medical Mycology Research Center of Chiba University, the LAMP method (a new method for DNA detection), and the real-time PCR method, and then a method to treat fungal infections more effectively than conventional ones.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Jointly develop a rapid and simplified method to diagnose fungal infections and identify fungal species by using a DNA chip developed (for fungal species identification) by the Medical Mycology Research Center of Chiba University, the LAMP method (a new method for DNA detection), and the real-time PCR method, and then a method to more effectively treat fungal infections than conventional ones.
Activities	<ol style="list-style-type: none"> <li>1. Collected patient data on the onset of a fungal infection, and collected and isolated fungal samples from patients</li> <li>2. Identified the subtypes of fungi isolated with the PCR or LAMP method</li> <li>3. Established a method to preserve pathogenic fungi isolated from patients</li> <li>4. Installed equipment, trained personnel, and worked with those trainees to produce a DNA chip in Brazil and put a setting in place for DNA chip production in the country</li> <li>5. Verified the effectiveness of the diagnostic method based on the DNA chip for fungal species identification</li> <li>6. Conducted a sensitivity and specificity test on the measurement of <math>\beta</math>-glucan for serum diagnosis</li> <li>7. Conducted a susceptibility test of fungi against medicinal agents, and examined appropriate methods to administer those agents</li> <li>8. Created a procedure textbook in Portuguese</li> <li>9. Held a symposium to make a presentation about the outputs</li> </ol>
Implementation period	April 2010–March 2013
Implementing agencies (Recipient country side)	the State University of Campinas, Brazil
Direct beneficiary	Staff working at hospitals and research institutions
Participating Japanese experts	Professor Katsuhiko Kamei, the Medical Mycology Research Center of Chiba University, among twelve other participants (including an employee of a private sector company)
<b>Case evaluation results (summary)</b>	
Both of the following output indicators were satisfactorily attained: (1) conducting an epidemiological analysis of all AIDS and other immunocompromised patients with a fungal infection in the State University of Campinas (Brazil) during the project period; and (2) transferring to the State University of Campinas techniques concerning the DNA chip, $\beta$ -glucan measurement, the real-time PCR method, and the LAMP method, and confirming the practicality of those techniques transferred.	
<b>Major noteworthy output produced in this case</b>	
“The Campinas University Hospital’s medical care manual including a rapid test method for fungal detection” and “Procedure manual in Portuguese on the DNA microarray, LAMP method, $\beta$ -glucan measurement, fungal susceptibility testing, and the real-time PCR method”	
<b>The process by which the noteworthy output concerned was produced</b>	
Activities 1 to 8 described above.	

**Process by which the noteworthy output was used**

In terms of the so-called “social implementation” aspect, in which the training outcome are utilized in the real world, the diagnostic method to detect fungal infections has been used by hospitals since its development in the Project. Moreover, the equipment used for the Project has been maintained and managed by the implementing agency in Brazil in a unique manner they developed by themselves based on the instruction and detailed guidance provided by participating Japanese researchers.

### 3) Logic model

**Overall Goal:** Infection control for HIV-positive and other immunocompromised patients and their QOL improvement  
**Note:** The Project is already completed, but another project is underway to develop a method, beyond the method to diagnose fungal infections and identify fungal species for treating fungal or other bacterial infections in immunodeficiency. However, as of the follow-up evaluation stage, neither indicator for the overall goal is clarified, nor is the achievement level of the latter project determined. The findings about fungi and the rapid test method for fungal detection obtained through the Project were included in the medical care manual of the implementing agency's attached hospital, and the manual has been used by hospitals, etc. in Brazil for the diagnosis of fungal infections. Furthermore, efforts are being made to disseminate the knowledge in other Portuguese-speaking countries and neighboring countries. (Source: Follow-up Evaluation Report)



**Project Purpose (Outcome):** Jointly develop a rapid and simplified method to diagnose fungal infections and identify fungal species by using a DNA chip developed (for fungal species identification) by the Medical Mycology Research Center of Chiba University, the LAMP method (a new method for DNA detection), and the real-time PCR method, and then a method to more effectively treat fungal infections than conventional ones.

**Performance: Achieved.** Both of the following output indicators were satisfactorily attained: (1) conducting an epidemiological analysis of all AIDS and other immunocompromised patients with a fungal infection in the State University of Campinas (Brazil) during the project period; and (2) transferring to the State University of Campinas techniques concerning the DNA chip,  $\beta$ -glucan measurement, the real-time PCR method, and the LAMP method, and confirming the practicality of those techniques transferred. (Source: Project Completion Report)

**Sustainability of the Outcome:** All the following matters indicate that the sustainability of the outcomes is high. (Source: Follow-up Evaluation Report)

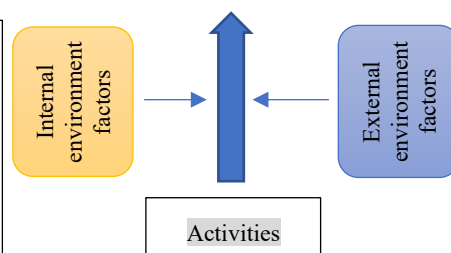
- A new examination probe based on the outcome was developed by the implementing agency in Brazil after the Project, and an effort for its practical application is underway.
- Even after the completion of this project, efforts are being made for the diagnosis, identification, and treatment of fungal or other bacterial infections for immunocompromised patients. The findings about fungi and the rapid test method for fungal detection obtained in the Project was included in medical care manual of the implementing agency's attached hospital, and the manual has since been used by hospitals in Brazil for the diagnosis of fungal infections.
- Settings and arrangements for the research in Brazil have been enhanced and expanded, as shown by the Brazilian government's granting of a subsidy and a new laboratory for the research.

(Note: there is no PDM created for the Project; the outputs described below are specific indicators for the project purpose rather than the means taken to achieve the project purpose.)

**Output:** The following outputs are recognized. (Source: Project Completion Report)

1. The Project's Brazilian participant researchers became more proactive and self-reliant toward research activities through participation in the Project and voluntarily created the "Practical Manual on the Use of Antibacterial Substances," an output outside the scope of the original research plan.
2. A total of 20 scholarly paper (14 international and 6 domestic papers) were accepted for publication.
3. The "Procedure Manual in Portuguese on the DNA Microarray, LAMP Method,  $\beta$ -glucan Measurement, Fungal Susceptibility Testing,<sup>1</sup> and the Real-time PCR Method" is scheduled to be completed by the completion of the Project.
4. The "Practical Manual on the Use of Antibacterial Substances," which is under preparation for the use in Brazil and other Portuguese-speaking countries in Africa, is scheduled to be completed by the completion of the Project.

- (Promotional factors) As described below.
- Interchange of an unprecedented level conducted among the people concerned;
  - Qualified coordinators allocated;
  - Efforts made to enhance communications;
  - Guidance provided to enhance project management skills; and
  - Efforts made to ensure sustainability.



(Obstructive factors) There were some influences of the Great East Japan Earthquake during the three-year Project, including a delay in the procurement of equipment.

Noteworthy output 17. Diagnostic techniques for infectious diseases including COVID-19

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Diagnostic techniques for infectious diseases including COVID-19 Note: This project targeted malaria, Schistosomiasis mekongi, <sup>35</sup> and Opisthorchiasis, <sup>36</sup> but as a noteworthy output, although it did not belong to the initial research themes, "Diagnostic techniques for infectious diseases including COVID-19" were selected. The reason is that Laotian researchers have mastered a PCR method <sup>37</sup> and DNA analysis (mutation analysis) techniques, and they acquired those diagnostic techniques for infectious diseases that can be widely applied such as to COVID-19 countermeasures even after the completion of the project. As a result, it can be said that Laos was able to prepare human resources and equipment to deal with unknown infectious diseases before they became epidemic.
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Technology
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: SATREPS (Science and Technology Research Partnership for Sustainable Development) Region: Asia Approach to be taken (testing/research/early warning): Testing Infectious diseases: Infectious diseases in general
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	To meet the needs for effective infection control and prevention of drug resistance, it is important to further strengthen the formulation of scientifically based countermeasure plans. This project was implemented for malaria, Schistosomiasis mekongi, and Opisthorchiasis, but the PCR method, DNA diagnostic techniques, and the related equipment introduced there have been used for COVID-19 countermeasures. As of September 2021, the COVID-19 variant analysis is implemented only at Pasteur Institute of Laos (IPL), and this noteworthy output has become a very important initiative for the country.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use after the end of the project	Since January 2020, the DNA diagnostic techniques acquired by participating in this project have been used for the COVID-19 testing. In addition, regarding malaria, Schistosomiasis mekongi, and Opisthorchiasis, which were originally the target of the project, malaria is diagnosed by conducting a DNA test especially in the case of treatment failure

<sup>35</sup> Schistosomiasis is one of the neglected tropical diseases. Schistosomiasis infects humans via snails (such as *Oncomelania nosophora*) that live in freshwater as intermediate hosts. As the condition progresses, it causes diarrhea and bloody stool, and if left untreated, it may cause long-term damage to the liver, and may induce cancer in specific organs, resulting in death.

<sup>36</sup> Opisthorchiasis is one of the neglected tropical diseases. It is a disease that causes symptoms such as fever and abdominal pain through infection by eating freshwater fish and shellfish that have larvae of flukes such as liver flukes. It causes inflammation and fibrosis around the hepatic duct and may eventually progress to bile duct cancer.

<sup>37</sup> A technique that amplifies and detects genes (DNA) such as viruses.

		(recurrence, relapse, reinfection). It contributes to diagnosis and treatment, confirmation of drug resistance, and measures against the spread of infection. On the other hand, the DNA detection method for diagnosing Schistosomiasis mekongi and Opisthorchiasis has been utilized at the research level.
6. Main user	Identify users of the noteworthy output	Pasteur Institute of Laos (IPL)
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	IPL researchers, Indirect final beneficiaries are infectious disease patients mainly including malaria, Schistosomiasis mekongi, Opisthorchiasis, and COVID-19
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Prior to implementing this project, the DNA detection method and diagnostic techniques were rarely implemented in Laos, and no measures were taken based on scientific evidence. Through this project, JICA contributed to the diagnosis and treatment of malaria and the determination of drug resistance. It is also applied to COVID-19 testing.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	<ul style="list-style-type: none"> <li>• Although it is not exactly the case of name recognition of the noteworthy output, medical professionals currently recognize that the IPL laboratory is a COVID-19 testing institution. The IPL conducts advanced tests that cannot be conducted by other institutions in Laos.</li> <li>• Through academic papers, conference presentations, and WHO reports, these noteworthy outputs are known to international infectious disease researchers and experts.</li> </ul>
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Name of the project from which noteworthy outputs were identified: “The Project for Development of Innovative Research Technique in Genetic Epidemiology of Malaria and Other Parasitic Diseases in Lao PDR for Containment of Their Expanding Endemicity” Cooperation period: May 2014–April 2019 Related project: Nothing in particular
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	A phase in which appropriate and prompt testing and diagnosis are required when patients with suspected infection is found during an infectious disease epidemic including an unknown infectious disease.
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	<ul style="list-style-type: none"> <li>• Some equipment related to infectious disease testing and research, such as the DNA sequencer introduced in this project, is extremely delicate, and it is necessary to provide sufficient training for users, perform maintenance and inspection, and to keep such equipment in a state where the users can respond in case of trouble.</li> <li>• In producing noteworthy output, work to thoroughly discuss what kinds of techniques are lacking in the recipient country and what kinds of diagnostic techniques for infectious disease can be introduced with the person in charge of the recipient country (such as employees of the Ministry of Health, staff members of the research institute, and medical personnel) is important.</li> </ul>



13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	<ul style="list-style-type: none"> <li>• Links:            (Ex-ante evaluation report, mid-term review report, and terminal evaluation report)            「 <a href="https://www2.jica.go.jp/ja/evaluation/index.php?ankenNo=1300773&amp;schemes=&amp;evalType=&amp;start_from=&amp;start_to=&amp;list=search">https://www2.jica.go.jp/ja/evaluation/index.php?ankenNo=1300773&amp;schemes=&amp;evalType=&amp;start_from=&amp;start_to=&amp;list=search</a>」            (Implementation report (FY2013, FY2014))            「 <a href="https://www.jst.go.jp/global/kadai/h2508_laos.html">https://www.jst.go.jp/global/kadai/h2508_laos.html</a>」</li> </ul>
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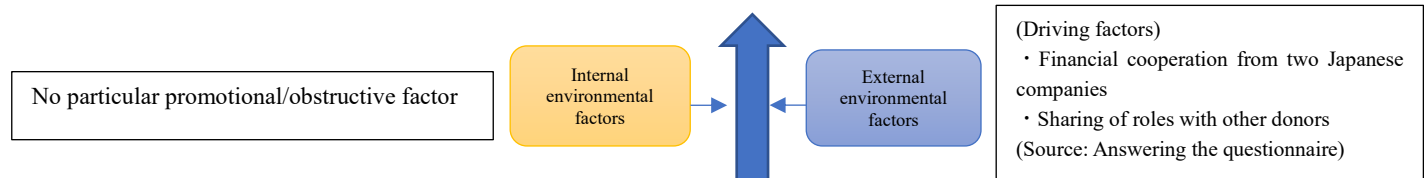
2) Project outline

<b>Case (project) name</b>	
(SATREPS) The Project for Development of Innovative Research Technique in Genetic Epidemiology of Malaria and Other Parasitic Diseases in Lao PDR for Containment of Their Expanding Endemicity	
<b>Background of case implementation</b>	
<p>In Laos, important parasitic infectious diseases such as malaria and trematodiasis (including Schistosomiasis mekongi and Opisthorchiasis) are a serious socio-economic burden. The government of the country has distributed long-term residual insecticide-containing mosquito nets and provided anthelmintic agents with the support of development partners and other organizations. However, molecular genetic and epidemiological studies on parasitic infectious diseases are not sufficient, and it is an urgent task to further strengthen the formulation of scientifically based countermeasure plans in order to control infection and respond to drug resistance.</p> <p>To respond to this situation, at the request of the government of Laos, JICA implemented “The Project for Development of Innovative Research Technique in Genetic Epidemiology of Malaria and Other Parasitic Diseases in Lao PDR for Containment of Their Expanding Endemicity” (hereinafter referred to as the "Project") for five years from May 2014 within the framework of SATREPS with the Center of Malariology, Parasitology and Entomology (CMPE), Ministry of Health of Laos and the Pasteur Institute of Laos (IPL) as counterpart organizations. This cooperation supported the development and dissemination of simpler and more accurate diagnostic methods for malaria, Schistosomiasis mekongi, and Opisthorchiasis. As a result, it was expected that measures based on genetic epidemiological diagnostic methods would be utilized for administrative services.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	<p>Project Purpose: Research results based on the methods for the genetic epidemiology diagnosis of malaria, schistosomiasis mekongi and opisthorchiasis viverrini are utilized in government services such as in diseases control.</p> <p>(In this Project, the target of infectious diseases was narrowed down to malaria, Schistosomiasis mekongi, and Opisthorchiasis, but after the Project was completed, as the techniques obtained during it contributed to COVID-19 countermeasures, "Outputs" include the outputs of COVID-19 measures.)</p>
Outputs	<p>Technical cooperation, provision of machinery and equipment, training in Japan, and other activities were conducted through experts for the purpose of achieving the following outputs.</p> <ol style="list-style-type: none"> <li>1. More convenient and accurate methods (PCR method, LAMP method, etc.) for the diagnosis of malaria, schistosomiasis mekongi and opisthorchiasis viverrini are developed and utilized.</li> <li>2. Temporal and spatial epidemiological situations of pathogens and vectors of malaria, schistosomiasis mekongi and opisthorchiasis viverrini is monitored.</li> <li>3. The mechanism of emergence and expansion of the drug-resistant malaria is analyzed.</li> <li>4. Based on the surveillance system using the developed diagnostic methods on malaria, schistosomiasis mekongi and opisthorchiasis viverrini, education for people is strengthened and endemicity is monitored together with the local government.</li> <li>5. Capacity of researchers and administrative officers for the control of malaria and other parasitic diseases is strengthened.</li> </ol>
Activities	Activity groups corresponding to each of the above outputs
Implementation period	May 2014–April 2019
Implementing agencies (Recipient country side)	Ministry of Health, Center of Malariology, Parasitology and Entomology (CMPE), Pasteur Institute of Laos (IPL) (Laos side representative agency), Laos Tropical Public Health Institute (LaoTPHI), and National Center for Laboratory and Epidemiology (NCLE)
Direct beneficiary	IPL and its researchers
Cooperating Japanese agency	National Center for Global Health and Medicine (NCGM) (Japan side representative organization), The University of Tokyo, University of the Ryukyus, Juntendo University, and Tokyo Medical and Dental University
Participating Japanese experts	Total of 4 long-term experts (1 parasitology research, total of 3 for work coordination), 73 short-term experts

<b>Case evaluation results (summary)</b>
<p>Efforts related to malaria, Schistosomiasis mekongi, and Opisthorchiasis, which are the initial target diseases, were evaluated as “high” in the terminal evaluation and the answers to the questionnaire given to the implementers of the Project. This Project targeted malaria, Schistosomiasis mekongi, and Opisthorchiasis, but great outputs were obtained especially for malaria. The project has obtained important findings and research outputs on the epidemic situation (including asymptomatic carriers) in Laos and the mechanism that contributes to drug resistance, and they have been published as academic papers. In addition, DNA detection method using the LAMP method which is a simpler and more accurate diagnostic method has also been introduced at major research facilities and testing facilities in the north, center, south, and in Vientiane, and training of health personnel engaged in parasitic disease control at those facilities is also underway. However, the DNA detection method for diagnosing Schistosomiasis mekongi and Opisthorchiasis is mainly used at the research level because the need for its use in the diagnostic method was not so high. It was analyzed that the initial goal setting did not meet the need.</p> <p>As mentioned above, the development of "Diagnostic techniques for infectious diseases including COVID-19" can be evaluated as an unexpected output.</p>
<b>Major noteworthy output produced in this case</b>
Diagnostic techniques for infectious diseases including COVID-19
<b>The process by which the noteworthy output concerned was produced</b>
<p>This noteworthy output and diagnosis techniques for infectious diseases were developed as part of the activities related to the abovementioned Output 1. (For malaria, Schistosomiasis mekongi, and Opisthorchiasis, which are the initial target diseases, after developing a simpler and more accurate diagnostic method, an epidemiological survey on the mechanism of drug resistance development and spread was conducted on a large scale, involving more than 170 local healthcare professionals. The mechanism of epidemics of each disease and the emergence and spread of drug-resistant malaria in Laos was analyzed.)</p>
<b>Process by which the noteworthy output was used</b>
<p>Prior to the implementation of this Project, the DNA detection method and diagnostic techniques were rarely implemented in Laos, and no scientifically based measures were taken. Diagnosis techniques for infectious diseases and gene mutation analysis techniques using a DNA sequencer have been applied to COVID-19. As of September 2021, the COVID-19 variant analysis can be performed only with IPL.</p> <p>For malaria, which was the target of the Project, the Project contributed to diagnosis and treatment, and determination of drug resistance.</p>

### 3) Logic Model

**Impact:** "Knowledge and techniques related to parasitological research acquired through the Project will be maintained and improved." Degree of achievement: Almost achieved (Source: Questionnaire for the thematic evaluation study) <Assumed impact> Even after the Project is completed, Japanese researchers continued to be stationed at IPL to conduct joint research, and knowledge and skills were maintained and improved. <Unexpected impact> The DNA diagnosis and PCR method techniques and knowledge cultivated in the Project were applied to the COVID-19 testing. (Basis for the above) <Assumed impact> Regarding malaria, too, which was the target of this Project, the Project continues to contribute to diagnosis, treatment, and countermeasures by conducting a DNA test. <Unexpected Impact> Laos researchers have acquired the ability to perform gene mutation analysis of unknown pathogens using difficult-to-handle DNA sequencers.

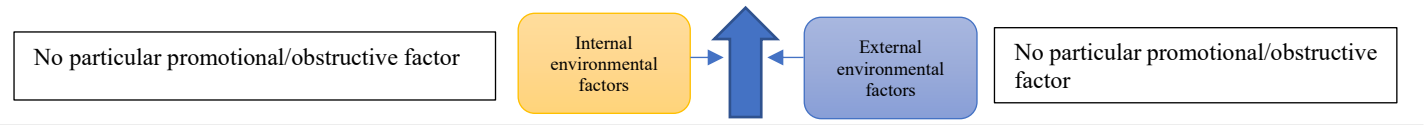


**Project Purpose (Outcome):** "Research results based on the methods for the genetic epidemiology diagnosis of malaria, schistosomiasis mekongi and opisthorchiasis viverrini are utilized in government services such as in diseases control." Degree of achievement: At the time of terminal evaluation, the degree of achievement is **high**. (Source: Terminal evaluation, answers to the questionnaire)

- (Malaria) We have obtained important findings and research outputs on the epidemic situation in Laos and the mechanism that contributes to the development and spread of drug resistance gene mutations, and many research outputs have been published as academic papers. The DNA detection method has been introduced to major research and testing facilities and prefectural health bureaus, and the development of health personnel has also progressed. (Schistosomiasis mekongi, Opisthorchiasis) The technical development work of the DNA detection method has been completed, and the DNA detection method has been established by IPL. However, initially, the goal was to utilize it as a diagnostic method, but in reality there was not so much need for recognition and it was only utilized at the research level.
- The research outputs of the Project were always shared with the Ministry of Health, and JICA long-term experts also participated in the national level infectious disease control conference. In fact, the inspection techniques claimed by this Project are described in the "National Malaria Elimination Strategic Plan 2016–2020" and the "Malaria Elimination Surveillance Guidelines" (candidates for noteworthy output) and had a direct impact on government policy.

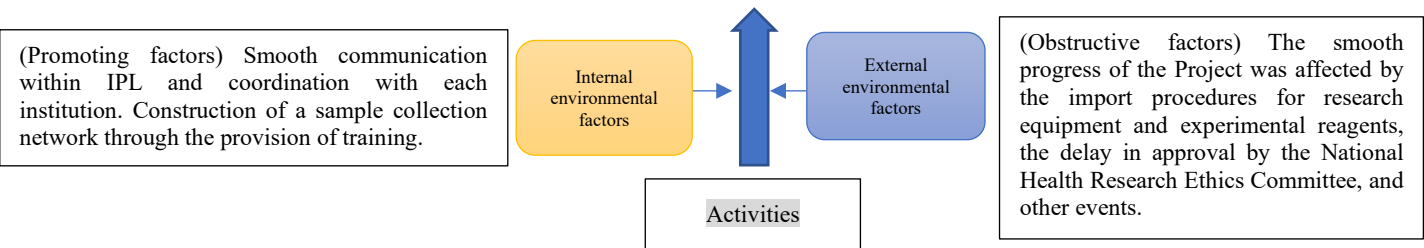
**Sustainability of outcome:** Self-sustaining development and self-development of the benefits generated by the Project **are expected to some extent**. (Policy) The Laos development plan also states the importance of malaria and parasite control, and its policy importance is expected to be maintained. (Finance) The budget for maintaining joint research with the National Center for Global Health and Medicine (NCGM) by a Japanese private company is secured. (Technology) NCGM has decided to continue joint research at IPL even after the Project is completed, and research and inspection techniques are expected to remain at IPL.

In this project, there are the following technologies, infrastructures, institutions/policies that are candidates for "noteworthy outputs"  
 "Diagnostic techniques for infectious diseases including COVID-19", "IPL Parasitology Laboratory", "DNA detection methods for malaria diagnosis, Schistosomiasis mekongi, and Opisthorchiasis diagnosis", "Epidemiological research methods on the mechanism of drug resistance development and spread", "National Malaria Elimination Strategic Plan 2016–2020" and "Malaria Elimination Surveillance Guidelines"



**Outputs:** (At the time of terminal evaluation) **Output 1, 2, 4, and 5 are generally achieved, and the degree of achievement of Output 3 is extremely high**. (Source: Terminal evaluation)

1) More convenient and accurate methods (PCR method, LAMP method, etc.) for the diagnosis of malaria, schistosomiasis mekongi and opisthorchiasis viverrini are developed and utilized. 2) Temporal and spatial epidemiological situations of pathogens and vectors of malaria, schistosomiasis mekongi and opisthorchiasis viverrini is monitored. 3) Mechanism of emergence and expansion of the drug resistant malaria is analyzed. 4) Based on the surveillance system using the developed diagnostic methods on malaria, schistosomiasis mekongi and opisthorchiasis viverrini, education for people is strengthened and endemicity is monitored together with the local government. 5) Capacity of researchers and administrative officers for the control of malaria and other parasitic diseases is strengthened.



Noteworthy output 18. Lead compounds produced through joint research between Japan and Indonesia

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Lead compounds produced through joint research between Japan and Indonesia Note: This output belonging to the category of medicine/vaccine is at the research level and not yet in use.
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Technology
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: SATREPS Region: Asia Approach to be taken (testing/research/early warning): Research Infectious diseases: Malaria, Entamoeba histolytica
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	Protozoan infectious diseases such as malaria and Entamoeba histolytica have caused enormous health hazards to people, and dealing with these infections is an urgent issue. Since there were still no effective vaccines against these protozoan infectious diseases, and very limited effective drugs, there was an urgent need to develop new drugs that are inexpensive, highly effective, and safe.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	Lead compounds with strong medicinal properties and high selective toxicity to protozoans have been selected by animal experiments. Commercialization of the lead compounds is in progress with the possibility of mass production. Technology transfer to Indonesian researchers is also in progress. (Source: Report on the output of commissioned research from 2014 to 2019)
6. Main user	Identify users of the noteworthy output	The following research institutes Indonesian side (BPPT Biotech Center (BTC-BPPT), Airlangga University (AU), and Indonesian Institute of Sciences (LIPI)) Japan side (University of Tsukuba, Kitasato University, The University of Tokyo, and MicroBiopharm Japan Co., Ltd.)
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Same as above.
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	Regarding the issue that the technological base necessary for application to drug discovery was not cultivated in Indonesia and the ability to develop new drugs using biological resources was insufficient, purification and mass production at the local place for both anti-malaria lead compounds and anti-Entamoeba histolytica lead compounds became possible, and the technology was transferred to the Indonesian side. An Indonesian researcher became a lead author and

		published four academic papers that require formal peer review. (Source: 2020 Project Completion Report).
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	From the following facts, the noteworthy output seems to be well known among researchers. By March 2020, Indonesian researchers became a lead author and had published four academic papers that require formal peer review. There are two other published academic papers. In addition, presentations at international conferences were made 32 times in total.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which the noteworthy output was extracted: Project for Searching Lead Compounds of Anti-malarial and Anti-amebic Agents by Utilizing Diversity of Indonesian Bio-resources Cooperation period: April 2015 to March 2020
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	Development phase of new drugs using biological resources. (The know-how that led to the production of this noteworthy output can be utilized in future new drug development.)
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	(Hereafter, the points to be noted in the development process of the noteworthy output are described.) It is premised that the government policy is in line with drug discovery research by using natural resources. In this project, the Convention on Biological Diversity established by the Indonesian government made it difficult for foreign capital to access biological resources. Therefore, at the request of the Indonesian government, the Japanese side cooperated to create an environment that enables Indonesia to purify and mass-produce lead compounds independently and appropriately for drug discovery.
13. Presentation of specific content	Add a link to the actual study reports/evaluation reports	Prior evaluation <a href="https://www2.jica.go.jp/ja/evaluation/pdf/2014_1400738_1_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2014_1400738_1_s.pdf</a> Implementation report <a href="https://www.jst.go.jp/global/kadai/pdf/h2609_h26.pdf">https://www.jst.go.jp/global/kadai/pdf/h2609_h26.pdf</a> Post-event report <a href="https://openjicareport.jica.go.jp/938/938/938_108_1000043935.html">https://openjicareport.jica.go.jp/938/938/938_108_1000043935.html</a>

## 2) Project outline

<b>Case (project) name</b>	
(SATREPS) Project for Searching Lead Compounds of Anti-malarial and Anti-amebic Agents by Utilizing Diversity of Indonesian Bio-resources	
<b>Background of case implementation</b>	
Protozoan infectious diseases such as malaria and Entamoeba histolytica cause enormous health damage to people, and the response to them is an urgent issue together with the response to emerging zoonotic diseases such as HIV/ AIDS, tuberculosis, highly pathogenic avian influenza, and novel influenza. There are still no effective vaccines against these protozoan infectious diseases, and very limited effective drugs. Under such environment, there was an urgent need to develop new drugs that are inexpensive, highly effective, and safe. Meanwhile, Indonesia is among the world leaders in terms of biodiversity and bioresource value, but the technological base necessary for its application to drug discovery has not been cultivated in the country, and its ability to develop new drugs that are indispensable for controlling infectious diseases was inadequate.	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal: Indonesia can independently conduct drug discovery research in the future. Project Purpose: Through joint research with Japanese research institutes, research capabilities related to the development of anti-malaria and anti-Entamoeba histolytica drugs utilizing biodiversity of Indonesian research institutes will be strengthened.
Outputs	1. Substances with antimalarial activity are identified from Indonesian biological resource extracts (such as microorganisms and plants). 2. Substances with anti-Entamoeba histolytica activity are identified from Indonesian biological resource extracts (such as microorganisms and plants). 3. Technologies and systems that contribute to drug discovery using biological resources are established at research institutes on the Indonesian side.
Activities	Activity groups corresponding to each of the above outputs
Implementation period	April 2015-March 2020
Implementing agencies (Recipient country side)	Competent ministries and agencies: Ministry of Research and Technology of Indonesia, Research institutes: BPPT Biotech Center (BTC-BPPT), Airlangga University, and Indonesian Institute of Sciences
Direct beneficiary	Approximately 29 researchers, from the implementing agency (Agency for the Assessment and Application of Technology, BPPT): 21 people, Airlangga University: 3 people, Indonesian Institute of Sciences: 5 people
Cooperating Japanese agency	University of Tsukuba, Kitasato University, The University of Tokyo, Micro Biopharm Japan Co., Ltd.
Participating Japanese experts	1. Chief Advisor/Tropical Disease Research (Short-term Expert) 2. Business coordination (Long-term expert) 3. Researchers with expertise in malaria, amebiasis, compound separation and purification, compound structure analysis, and researchers with other necessary expertise (short-term experts)
<b>Case evaluation results (summary)</b>	
According to the commissioned research output report and the Project Completion Report, it can be said that the evaluation of this project is very high. The Project Purpose was achieved. The Overall Goal that "Indonesia can independently conduct drug discovery research in the future" seems to have been achieved to some extent, as evidenced by the fact that purification and mass production at the local place for both anti-malaria lead compounds and anti-Entamoeba histolytica lead compounds became possible through dispatched Japanese experts and training in Japan and the technology was transferred to the Indonesian side. In addition, regarding the expected Impact that "If a compound that will be a candidate for a new drug is found, we will collaborate with companies to promote research for practical use," the idea can be said to be almost achieved because a pharmaceutical company (MicroBiopharm Japan Co., Ltd.), which is a collaborative researcher, published this project as the company's achievement in the paper of the Japan Society for Bioscience, Biotechnology, and Agrochemistry. (Source: Kagaku to Seibutsu 54 (1): pp 48-53 (2016))	
<b>Major noteworthy output produced in this case</b>	
Lead compounds produced as a result of joint research between Japan and Indonesia	

**The process by which the noteworthy output concerned was produced**

Researchers in both Japan and Indonesia needed the financial and institutional support of government to carry out original research. Such support was provided by JICA and the Indonesian government, and research activities have proceeded smoothly. The acceptance of training in Japan for 3 people for a long term and 48 people for a short term also promoted the creation of the noteworthy output. By including a pharmaceutical company (MicroBiopharm Japan Co., Ltd.) as a collaborative researcher in the project experts from the beginning, collaboration for practical use was promoted.

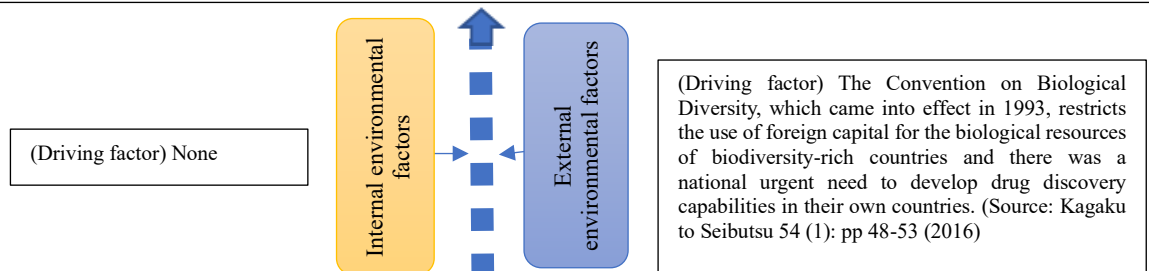
**Process by which the noteworthy output was used**

By the end of the project (March 2020), an Indonesian researcher became a lead author and had published four academic papers that require formal peer review. There are two other published academic papers. A total of 32 presentations were made at international conferences.



### 3) Logic Model

**Overall Goal (Impact) Achievement:** According to the commissioned research output report and Project Completion Report, regarding the Overall Goal that "Indonesia can independently conduct drug discovery research in the future," purification and mass production at the local site for both anti-malaria lead compounds and anti-Entamoeba histolytica lead compounds became possible through dispatched Japanese experts and training in Japan, and the transfer of the technology to the Indonesian side has been completed. The reason for the prospect of independent drug discovery research for the future (Overall Goal) is that Indonesian researchers became lead authors and published four academic papers that require formal peer review. There are two other published academic papers. A total of 32 presentations were made at international conferences. (Source: 2020 Project Completion Report) In addition, regarding the expected Impact that "If a compound that will be a candidate for a new drug is found, we will collaborate with companies to promote research for practical use," a pharmaceutical company (MicroBiopharm Japan Co., Ltd.), which is a collaborative researcher, published this project as the company's achievement in the paper of the Japan Society for Bioscience, Biotechnology, and Agrochemistry. (Source: Kagaku to Seibutsu 54 (1): pp 48-53 (2016))



**Project Purpose (Outcome):** With the purpose of "strengthening research capabilities related to the development of anti-malaria and anti-Entamoeba histolytica drugs utilizing biodiversity of Indonesian research institutes through joint research with Japanese research institutes," achievement of the following indicators was aimed at.

- 1) At least one lead compound having antimalarial activity confirmed to be effective in animal experiments will be determined.
- 2) At least one lead compound having anti-Entamoeba histolytica activity confirmed to be effective in animal experiments will be determined.
- 3) Two or more research papers in which Indonesian researchers are leading authors or play a considerable role will be published in a peer-reviewed academic journal by an Indonesian research institution.

**Achievement:** Indicators 1, 2, and 3 were achieved, and the purpose was achieved.

(Source: Report on the output of commissioned research 2017)

**Sustainability of the Outcome:** All the following matters indicate that the sustainability of the outcomes is high.

**Policies/institution:** Under the Convention on Biological Diversity, the purification and mass production of lead compounds unique to Indonesian research institutes are required throughout the future.

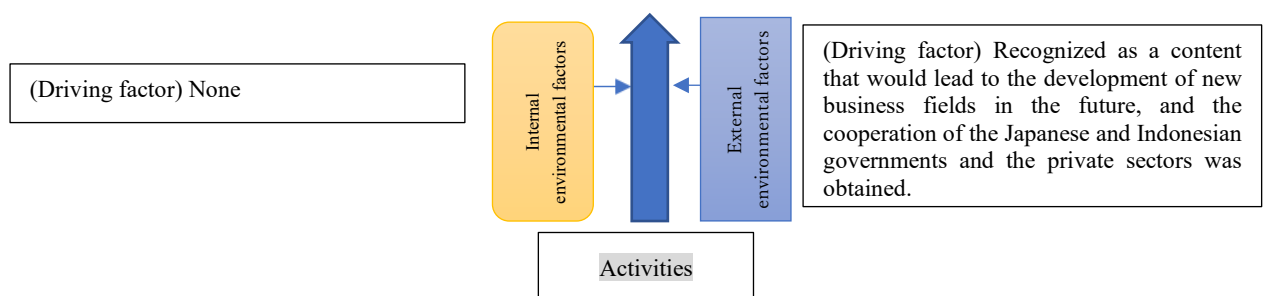
**Technology:** Technology transfer to Indonesian researchers is in progress.

**Business environment:** A network with Japanese research institutes and companies is formed. (Source: Report on the output of commissioned research from 2014 to 2019)

**Output:** The following outputs have been confirmed.

1. The microbial resource library in Indonesia was prepared for the purification of lead compounds for drug discovery.
2. The Project has established a screening system for adjusting target enzymes and growth inhibitors of malaria and Entamoeba histolytica, and achieved optimization of the adjustment method and mass synthesis.
3. A strong network of drug discovery was formed between the Japanese side (University of Tsukuba, Kitasato University, The University of Tokyo, and MicroBiopharm Japan Co., Ltd.) and the Indonesian side (BPPT Biotech Center, Airlangga University, and Indonesian Academy of Sciences).
4. Established intellectual and technological foundations such as structural analysis and evaluation system with animal model of drug efficacy, Indonesian researchers became the lead or influential person in charge, and papers were published in many domestic and international academic journals.

(Source: Report on the output of commissioned research from 2014 to 2019)



Noteworthy output 19. Measles-rubella combined vaccines produced domestically in Vietnam

1) Noteworthy output

Item	Matters to be specified	Contents
1. Name	Identification of noteworthy output (that which is still in use at present)	Measles-rubella combined vaccines* produced domestically in Vietnam  *Combined vaccine effective for two diseases such as Measles and Rubella
2. Type	Select the type to which the good/service, such as institutions/policies, organization, technology, human resources, and infrastructure, belong	Technology
3. Category	Categorize by scheme/region/approach to be taken (testing/research/early warning) and type of infectious disease	Scheme: Technical cooperation project Region: Asia Approach to be taken (testing/research/early warning): Research Infectious disease: Measles and rubella
4. Importance	Describe the key points by which this noteworthy output was selected (e.g.: consistency with global trends in infectious disease control)	While the WHO's current Good Manufacturing Practices (cGMP) were complied with, support was provided for the capacity building of human resources and manufacturers required to produce Measles-Rubella combined Vaccines (MR vaccines), in addition to measles vaccines, and this has enabled domestic production of inexpensive and safe MR vaccines. In recent years, the number of rubella cases has increased in Vietnam, and not only is the health of children with rubella infection impaired, but also, although it has not surfaced so far, there is a growing awareness of the risk that pregnant women infected with rubella give birth to children having congenital rubella syndrome (CRS); therefore, the importance of implementing rubella prevention measures is becoming widely recognized. In response to such a situation and advice from the WHO, the Vietnamese government launched a campaign for the measles-rubella combined vaccines (MR vaccines) using imported vaccines in 2014. As a routine vaccination, the second measles vaccination was switched to MR vaccines. Under these circumstances, there was an urgent need to promote domestic production of MR vaccines.
5. Current usage status of noteworthy output	Whether the noteworthy output is still in use at present after the project completion	The Drug Administration of Vietnam (DAV) of the Ministry of Health issued a certificate of conformity to the Good Manufacturing Practices (GMP) in August 2016 for measles vaccines, rubella vaccines, and MR vaccines of the Center for Research and Production of Vaccines and Biologicals (POLYVAC) that produces MR vaccines. Since then, POLYVAC's products have been continuously used for routine vaccination in Vietnam. The MR vaccines produced domestically in Vietnam were incorporated into the national Expanded Program on Immunization (EPI) in March 2018, and vaccination for children in Vietnam commenced. In recent years, MR vaccines have also been used for epidemics among those including adults.

6. Main user	Identify users of the noteworthy output	Center for Research and Production of Vaccines and Biologicals (POLYVAC)
7. Direct beneficiary and population	Identify the beneficiary if user and direct beneficiary are different	Children and adults who need routine vaccination
8. Problem and issues solved	Whether or not the problems that were identified at the time of planning have been resolved.	It has enabled the efficient production of high-quality MR vaccines that could not be produced in Vietnam before, and the budget burden for routine vaccination has been reduced. Moreover, it has become possible to prepare for the urgent situation of a measles/rubella epidemic.
9. Name recognition of noteworthy output	To what extent and how the project is recognized by citizens and the government of the country concerned, such being featured in newspapers, research literature, and academic societies in the country concerned. If such is the case, add international recognition and overseas application cases.	The project that produced noteworthy output has been highly acclaimed in Vietnam and received the most prestigious “Minister of Health Award” in September 2017 that recognizes achievements in the medical field in Vietnam.
10. Details of JICA cooperation	Introduce the name of the project associated with noteworthy output, as well as the total cooperation period up to 2021, not only for the target project but also for the target organizations/institution	Project name from which noteworthy output was identified: The Project for Strengthening Capacity for Measles-Rubella Combined Vaccine Production Cooperation period: May 2013-April 2018 Related projects: Grant Aid Project “The Project for the Construction of the Facilities for Measles Vaccine Production” (2003-2005) and technical cooperation “The Strengthening Capacity for Measles Vaccine Production” (2006-2010) were implemented for the same implementing agency (Center for Research and Production of Vaccines and Biologicals (POLYVAC)). In particular, the experience, knowledge, and skills obtained from the preceding project, “The Strengthening Capacity for Measles Vaccine Production” (2006-2010), were effectively used in implementing this project.
11. Noteworthy output use phase	Since all undertakings are to be implemented as some kind of project, clarify in which phase of the project the noteworthy output should be used and the theme and scheme.	The noteworthy output is used for the prevention of measles and rubella
12. Points to keep in mind when using noteworthy output	Indicate some points to keep in mind, such as how noteworthy output can be used to become effective, as it is not necessarily the case that noteworthy output is always effective when used.	There is a point for the production of the noteworthy output as follows. The conditions for use are the ability to manufacture vaccines based on the standards of vaccine manufacturing, the ability of breeding and management of experimental animals, as well as the existence of properly managed and maintained equipment. In the case of the project concerned, there was a preceding technical cooperation project “The Strengthening Capacity for Measles Vaccine Production” from March 2006 to March 2010, and the above preparations were already made. In addition, the project is a rare example in which the vaccine production technology was transferred by a Japanese private firm through ODA technical

		cooperation project. It will be a good reference project of cooperation between government and private sector without using a certain scheme entitled as “public private partnership”.(From the terminal evaluation report)
13.Presentation of specific content	Add a link to the actual study reports/evaluation reports	<p>“The Strengthening Capacity for Measles Vaccine Production” Summary of mid-term review report (<a href="https://www2.jica.go.jp/ja/evaluation/pdf/2015_1200366_2_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2015_1200366_2_s.pdf</a>), ex-ante evaluation report (<a href="https://www2.jica.go.jp/ja/evaluation/pdf/2013_1200366_1_s.pdf">https://www2.jica.go.jp/ja/evaluation/pdf/2013_1200366_1_s.pdf</a>), and terminal evaluation report <a href="#">Search for Evaluation Reports   Project Evaluation   Project   JICA - Japan International Cooperation Agency</a></p>

## 2) Project Outline

<b>Case (project) name</b>	
(Technical cooperation project) The Project for Strengthening Capacity for Measles-Rubella Combined Vaccine Production	
<b>Background of case implementation</b>	
<p>In recent years, the number of rubella cases has increased in many countries. In Vietnam, the number of rubella cases was 7,259 in 2011, a remarkably high figure compared with neighboring countries: 169 cases in Laos and 1,096 cases in Cambodia (as the number of cases in 2008 was 873, it shows an increase of about 8 times).</p> <p>Under the national Expanded Program on Immunization (EPI), the Vietnamese government is working to develop a self-sufficiency (domestic production) system for vaccines to maintain a high vaccination rate for priority infectious diseases. In response to such a situation, a JICA technical cooperation project “The Project for Strengthening Capacity for Measles-Rubella Combined Vaccine Production” (March 2006-March 2010) was implemented with the Center for Research and Production of Vaccines and Biologicals (hereinafter “POLYVAC”) as its counterpart. As a result, domestic production of measles vaccines compliant with the Good Manufacturing Practices (GMP) of the Ministry of Health of Vietnam started in 2009, and these vaccines are used under the EPI in Vietnam. After that, the Vietnamese government implemented national campaigns in 2013 and 2014 and decided on a policy to incorporate measles-rubella combined vaccines into the EPI thereafter. Specifically, it was expected that the first vaccination of measles vaccines would be switched to the measles-rubella combined vaccines (hereinafter “MR vaccines”) at the time of project planning, and there was an urgent need to promote domestic production of MR vaccines. From May 2013 to March 2018, this project was implemented under an implementation system with Kitasato Daiichi Sankyo Vaccine Co., Ltd. as the Japanese implementing agency and POLYVAC as its counterpart.</p>	
<b>Case outline</b> (goals, activities, implementation period, implementing agency, beneficiary, participating Japanese experts, etc.)	
Goals	Overall Goal: Reduction of measles and rubella epidemics in Vietnam Project Purpose: MR vaccines that comply with international standards (WHO Current Good Manufacturing Practices, cGMP) are manufactured by POLYVAC
Outputs	1. POLYVAC has appropriate technical capabilities as an MR vaccine manufacturer. 2. POLYVAC can properly produce MR vaccines compliant with the WHO cGMP.
Activities	<p>1-1. Transfer the technology for the production of rubella stock solution through the production process of vaccine stock solution from the seed virus</p> <p>1-2. Transfer the technologies for final bulk<sup>38</sup>, filling, and lyophilization through the production process of MR vaccines</p> <p>1-3. Transfer the technology for quality control of products</p> <p>1-4. Collect and analyze information for reduction of the manufacturing cost per unit of MR vaccine</p> <p>2-1. Establish a validation system for manufacturing and quality control, and establish a validation technology of staff members</p> <p>2-2. Establish and implement a quality assurance function that conforms to the WHO cGMP standards</p> <p>2-3. Prepare and implement standard operating procedures (SOP) necessary for processes such as vaccine manufacturing, storage, and product receipt/shipment</p> <p>2-4. Transfer the technology for the preparation of documents required to meet the WHO cGMP standards and documents requiring approval by the National Regulatory Authority (NRA)</p> <p>2-5. Conduct performance qualification (PQ) and process validation (PV) for the manufacturing of vaccines from seed viruses</p> <p>2-6. Provide necessary advice for clinical trials of MR vaccines conducted under the control of Vietnam</p>
Implementation period	May 2013-March 2018
Implementing	Center for Research and Production of Vaccines and Biologicals (POLYVAC)

<sup>38</sup> "Final bulk" means a material prepared in one container, ready for immediate dispensing, and is recognized as uniform in properties and quality regardless of any part of its contents.

agencies (Recipient country side)	
Direct beneficiary	Center for Research and Production of Vaccines and Biologicals (POLYVAC)
Cooperating Japanese agency	Kitasato Daiichi Sankyo Vaccine Co., Ltd.
Participating Japanese experts	Chief Advisor, Deputy Chief Advisor, and experts on organizational management, GMP/validation, quality assurance, quality test, and facility/equipment calibration/validation, for 36 people in total and a cumulative total of 98.23 person/month with 226 trips (at the time of the terminal evaluation in August 2017)

#### Case evaluation results (summary)

As the Vietnamese government adheres to the policy of having a goal of domestic production of vaccines used in Vietnam itself, the project's relevance is extremely high. The effectiveness of the project is also extremely high, as the production of high-quality MR vaccines became possible and because the production system has been confirmed by the National Regulatory Authority (NRA) in Vietnam to be compliant with the WHO cGMP. It was determined that the efficiency is also high because the detailed process control by the project and the smooth implementation of clinical trials on the Vietnamese side are contributing to the achievement of the Project Purpose at a high level. Since this project has made it possible to supply the number of vaccines required for normal vaccination and outbreak response, achievement of the Overall Goal can also be fully expected by continuing the vaccination project. The policy of domestic production of vaccines has been maintained, and various initiatives have been taken to ensure the sustainability of the project effect; therefore, sustainability at the time of the project termination is also sufficiently guaranteed.<sup>39</sup> Based on these facts, this project has obtained high evaluation results in all items from the viewpoint of five evaluation criteria and can be determined to be a project that achieved the Output to be a model for other parties. (From the terminal evaluation)

#### Major noteworthy output produced in this case

Measles-rubella combined vaccines produced domestically in Vietnam

#### The process by which the noteworthy output concerned was produced

The noteworthy output was produced through almost all activities related to Outputs 1 and 2.

1) Project management and communication with relevant parties: By August 2017, a total of 36 JICA experts were dispatched to Vietnam a total of 226 times, and a total of 44 personnel in the Vietnamese counterpart were also dispatched to Japan to attend training for a total of 1,450 days. In particular, a management team led by JICA experts implemented progress and operation management in minute detail in cooperation with the Vietnamese counterpart. In the event of a technical problem, timely discussions for countermeasures were held through video conferences, emails, etc., via local staff (Japanese-Vietnamese interpreters) hired for the project. By contrast, technical cooperation has been promoted since the launch of the project by keeping in mind that POLYVAC becomes independent as a vaccine manufacturer, and POLYVAC has taken initiatives for management related to vaccine production with indirect support from JICA experts. The education system for new employees and the inventory management system are also functioning properly. In addition, most of the staff members in POLYVAC have continued to work for POLYVAC from the preceding project, fostering a relationship of trust with JICA experts, and communication was well maintained throughout the project period.

2) Ownership and independence: POLYVAC places great importance on independence as a vaccine manufacturer, and the level of ownership of POLYVAC for this project, which aims to manufacture MR vaccines compliant with the WHO cGMP, is high. In particular, for POLYVAC to be financially independent as a vaccine manufacturer, it has been working on the development of single-dose products and the breeding and growing of SPF rabbits within POLYVAC under the cooperation of JICA experts. If these initiatives are realized, it is expected to contribute to the reduction of manufacturing costs by mass production as well as the stabilization of finances along with an income increase. (From the terminal evaluation report)

#### Process by which the noteworthy output was used

The Drug Administration of Vietnam (DAV) of the Ministry of Health, which is in charge of licensing the NRA in Vietnam, issued a marketing approval certificate (registration number: QLVX-995-17) on March 27, 2017, for the MR vaccines made by POLYVAC (product name: MRVAC), about one year ahead of schedule. In response to the subsequent changes in regulations regarding the sales of vaccines in Vietnam, a small-scale rollout of MR vaccines was launched in four provinces in February 2018 for the reconfirmation of safety prior to full-scale use in EPI, which uses about 40,000 doses. Based on its results,

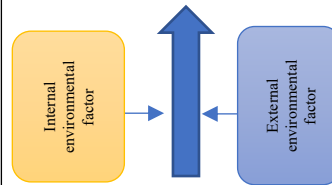
<sup>39</sup>Production of single doses, breeding of SPF rabbits (rabbits with the guaranteed absence of specific pathogens, which are used for product safety testing), passing of the WHO prequalification, etc.

a vaccination campaign is scheduled to be rolled out nationwide from April of the same year (Source: project completion report). Subsequently, the MR vaccines produced domestically in Vietnam were incorporated into the EPI in March 2018, and vaccination for children in Vietnam commenced. In recent years, MR vaccines have also been used for epidemics among those including adults (Source: “Technical Cooperation for MR Vaccine Production in Vietnam - Capacity Building - Access to Healthcare - Sustainability - Daiichi Sankyo Company, Limited.”  
([https://www.daiichisankyo.co.jp/sustainability/access\\_to\\_healthcare/capability/in\\_vietnam/](https://www.daiichisankyo.co.jp/sustainability/access_to_healthcare/capability/in_vietnam/)))

### 3) Logic Model

**Overall Goal (Impact):** Regarding the Overall Goal of “reduction of measles and rubella epidemics in Vietnam,” the coverage of measles vaccination conducted under the EPI has been maintained at 95% or more for the first vaccination (for 9-month-old children). For the second vaccination (for 18-month-old children), measles-rubella combined vaccines (MR vaccines) have been used since 2016, and the vaccination coverage improved from 86% in 2013 to 95% in 2016. Therefore, **it is highly probable that the long-term “reduction of measles and rubella epidemics in Vietnam” will be achieved.**

(Promotional factor) A clinical trial using MR vaccines manufactured in accordance with the WHO cGMP standards was conducted in 2016, and in March 2017, significantly ahead of the expected schedule, a marketing approval certificate was issued by the Drug Administration of Vietnam of the Ministry of Health.



(Promotional factor) The Ministry of Health of Vietnam set out a strategy to cover 100% of EPI vaccines and 30% of commonly used vaccines by domestic production by 2020. In addition, a high level of production capacity of POLYVAC was demonstrated during the outbreak of measles in 2014.

**Project Purpose (outcome):** “The MR vaccines that comply with the international standards (WHO Current Good Manufacturing Practices, cGMP) are manufactured by POLYVAC”

**Degree of achievement: For the following indicators 1 and 2, the purposes were achieved at the completion of the project.**

**Indicator 1:** Manufacturing license for MR vaccines is issued by the Drug Administration of Vietnam of the Ministry of Health.

**Indicator 2:** There are other data and information that can explain the enhanced capacity of POLYVAC as a vaccine manufacturer compliant with the WHO GMP. (Source: terminal evaluation)

**Sustainability of outcome:**

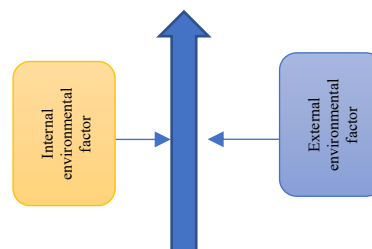
**Policy and institutional aspects:** Since the Ministry of Health of Vietnam set out a strategy to cover 100% of EPI vaccines and 30% of commonly used vaccines by domestic production by 2020, it has a policy to continue using the “vaccines produced by POLYVAC” in the EPI in Vietnam even after the end of the project period.

**Financial aspect:** Since POLYVAC can become independent as a vaccine manufacturer, the overseas sales of vaccines produced by POLYVAC and the sales of SPF\* rabbits were prepared. In contrast, after the end of the project period, POLYVAC needs to further strengthen its financial base to properly renew its equipment, etc.

**Technical aspect:** Through JICA’s cooperation to date, including the preceding project, POLYVAC has acquired the ability to comply with the WHO cGMP and produce measles vaccines and MR vaccines.

\*Rabbits with the guaranteed absence of specific pathogens, which are used for product safety testing

(Promotional factors) POLYVAC, which is a C/P institution, had a high level of ownership to be independent as a vaccine manufacturer. In addition, in the event of a technical problem, a timely response was taken through video conferences, emails, etc.



No notable factors

**Output: The following Outputs 1 and 2 were generally achieved by the time of project completion.** (Source: ex-post evaluation)

**Output 1:** POLYVAC has appropriate technical capabilities as an MR vaccine manufacturer

**Output 2:** POLYVAC can properly produce MR vaccines compliant with the WHO cGMP



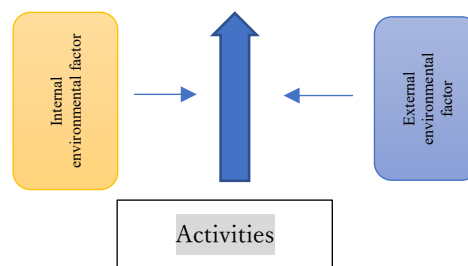
This project contains the following intellectual properties/systems that can be candidates for “**noteworthy output.**”

“Measles-rubella combined vaccines produced domestically in Vietnam”

(Notable promotional factors)

1. Consideration was given to provide ownership and independence, such as having daily morning meetings, weekly meetings, and eight working groups run by the counterpart.

2. A technology transfer implementation method was established to allow the counterpart to acquire technology reliably and efficiently and to allow even third parties to see the current situation. (Practice of visualization)



(Obstructive factor)

It was difficult to procure inexpensive and high-quality materials, spare parts, and consumables.