

Country Name	[Phase 1] Capacity development for NIHE to control emerging and re-emerging infectious diseases
Socialist Republic of Viet Nam	[Phase 2] Project for Capacity Development for Laboratory Network in Vietnam of Biosafety and Examination of Highly Hazardous Infectious Pathogens

I. Project Outline

Background	<p>Viet Nam had been exposed to various emerging infectious diseases, including severe acute respiratory syndrome (SARS) in 2003 and highly pathogenic avian influenza (H5N1) in 2004. The high-risk pathogens including avian influenza virus, SARS, HIV, had been mainly handled at the National Institute of Hygiene and Epidemiology (NIHE). However, despite the WHO regulation that high-risk pathogens must be handled at biosafety level 3 (BSL-3) laboratories, there had been no BSL-3 laboratory in Viet Nam as of 2006.</p> <p>Under such circumstances, a grant aid project “The Project for Improvement of Safety Laboratory for National Institute of Hygiene and Epidemiology” (2006-2008) to establish Viet Nam’s first BSL-3 laboratories at NIHE’s High-tech Center (HTC) and Phase 1 of this technical cooperation project (2006-2010) to enhance the capacity of NIHE to operate the BSL-3 laboratory were implemented. While these projects improved the diagnostic capacity of NIHE, biosafety and diagnostic skills of other institutions such as regional institutes (RIs) and provincial centers for preventive medicines (PCPMs) were not sufficient yet.</p>														
Objectives of the Project	<p>Through establishing the biosafety regulation/system in NIHE and the laboratory network, strengthening the capacity of national, regional and provincial laboratories and sharing information with neighboring countries, the project aimed to develop the capacity of these laboratories to examine highly hazardous infectious pathogens in Viet Nam, thereby controlling the epidemic of such pathogens.</p> <p>[Phase 1]</p> <ol style="list-style-type: none"> Overall Goal: BSL-3 laboratories are fully functioned and maintained in NIHE. Project Purpose: NIHE has capacity to examine highly hazardous transmissible pathogens properly in the BSL-3 laboratories that meets international standard. <p>[Phase 2] * These objectives can be regarded as the Overall Goal and the Project Purpose of the integrated intervention containing Phase 1 and Phase 2 (hereafter called “(JICA) intervention”).</p> <ol style="list-style-type: none"> 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. 														
Activities of the Project	<ol style="list-style-type: none"> Project Site: <ul style="list-style-type: none"> [Phase 1] Hanoi (NIHE) [Phase 2] Hanoi (NIHE), Ho Chi Minh City (Pasteur Institute of Ho Chi Minh City: PIHCMC), Nha Trang (Khanh Hoa Province) (Pasteur Institute of Nha Trang: PINT), Buon Ma Thuot (Dak Lak Province) (Tay Nguyen Institute of Hygiene and Epidemiology: TIHE) and ten pilot provinces (PCPMs Hue, Da Nang, Yen Bai, Dak Lak, Gia Lai, Nghe An, Thai Nguyen, Can Tho, Tien Gian, and Dong Nai) Main Activities: <ul style="list-style-type: none"> [Phase 1] Proposing revision on national biosafety regulation; development of Institutional Biosafety Regulation in NIHE; establishment and strengthening of Biosafety Department; establishment of Operation and Maintenance Division within Biosafety Department; development of Laboratory Operation Manual and Standard Operational Procedure (SOP); establishment of regular maintenance system; strengthening of management system for registration of highly pathogenic agents; development of biosafety training courses; training; etc. [Phase 2] Establishment of a mechanism for national and international collaboration on biosafety among laboratories; development of SOPs/ Good Microbiological Techniques (GMTs) for testing pathogens for laboratory network and SOPs for management of laboratory facilities/equipment; development of registration system of infectious pathogens for laboratories, training, workshops; etc. Inputs (to carry out above activities) <ul style="list-style-type: none"> [Phase 1] <table border="0"> <tr> <td>Japanese Side</td> <td>Vietnamese Side</td> </tr> <tr> <td>1) Experts: (Long-term) 4 persons; (Short-term) 34 persons</td> <td>1) Staff allocated: 162 persons</td> </tr> <tr> <td>2) Trainees received: 23 persons</td> <td>2) Offices and facilities: Two office rooms and equipment in NIHE</td> </tr> <tr> <td>3) Equipment: Mobile BSL-3 laboratory¹ for training; laboratory and office equipment</td> <td>3) Local cost</td> </tr> <tr> <td>4) Local cost including the cost for training, Mobile BSL-3 anteroom equipment, consumables, etc.</td> <td></td> </tr> </table> [Phase 2] <table border="0"> <tr> <td>Japanese Side</td> <td>Vietnamese Side</td> </tr> <tr> <td>1) Experts: (Long-term) 3 persons; (Short-term) 58</td> <td>1) Staff allocated: 76 persons</td> </tr> </table> 	Japanese Side	Vietnamese Side	1) Experts: (Long-term) 4 persons; (Short-term) 34 persons	1) Staff allocated: 162 persons	2) Trainees received: 23 persons	2) Offices and facilities: Two office rooms and equipment in NIHE	3) Equipment: Mobile BSL-3 laboratory ¹ for training; laboratory and office equipment	3) Local cost	4) Local cost including the cost for training, Mobile BSL-3 anteroom equipment, consumables, etc.		Japanese Side	Vietnamese Side	1) Experts: (Long-term) 3 persons; (Short-term) 58	1) Staff allocated: 76 persons
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¹ While the grant aid project was to install the BSL-3 laboratories at HTC that was being constructed by NIHE as of 2006, Phase 1 of this technical cooperation project was to provide the mobile BSL-3 laboratory that had been stored at NIID in Japan. The construction of the HTC laboratories (under the grant aid project) was completed in January 2008. In March 2013 (under Phase 2), the Mobile BSL-3 laboratory was moved to PIHCMC for their use with instructions and advices from Japanese experts.

	persons 2) Trainees received: 28 persons 3) Equipment: Laboratory equipment such as safety cabinets 4) Local cost including the cost for biosafety, maintenance, training, etc.	2) Office and facilities: Office space in NIHE 3) Local cost including the cost of hiring personnel, allowance, training, etc.
Project Period	[Phase 1] March 2006 – September 2010 (Extended period: March 2009 – September 2010) [Phase 2] February 2011 – February 2016	Project Cost [Phase 1] (ex-ante) 250 million yen, (actual) 390 million yen [Phase 2] (ex-ante) 350 million yen, (actual) 371 million yen
Implementing Agency	[Phase 1] [Phase 2] National Institute of Hygiene and Epidemiology (NIHE)	
Cooperation Agency in Japan	[Phase 1] [Phase 2] National Institute of Infectious Diseases (NIID)	

II. Result of the Evaluation

< Special Perspectives Considered in the Ex-Post Evaluation >

- This study regarded the two phases as one integrated intervention and evaluated it in the following way: for Relevance, evidence was confirmed for each phase, based on which the intervention as a whole was evaluated; for Effectiveness/Impact, the status of achievement of the Project Purpose, the continuation status of project effects and the achievement status of the Overall Goal were assessed as those of the JICA intervention as a whole using indicators selected from the existing ones by the ex-post evaluator based on logic; for Efficiency and Sustainability, evidence was confirmed, and judgment was made for the intervention as a whole.
- The target technical cooperation projects - Phase 1 (2006-2010) and Phase 2 (2011-2016) but especially Phase 1 - and the grant aid project (2006-2008) shared the common objectives of developing NIHE's capacity to treat dangerous pathogens, and the technical cooperation Phase 1 was implemented together with the grant aid project. Therefore, the positive changes observed as effects/impacts of this JICA intervention were combined effects/impacts of the technical cooperation and grant aid projects.²

1 Relevance

<Consistency with the Development Policy of Viet Nam at the Time of Ex-Ante Evaluation and Project Completion>

Both phases were consistent, from the time of ex-ante evaluation to the time of project completion, with Viet Nam's development policies such as "Ten-year Socio-Economic Development Strategy" (2001-2010), "Five-year Socio-Economic Development Plan (SEDP)" (2006-2010), SEDP (2011-2015), "Five-year Health Sector Development Plan" (2011-2015), and "Comprehensive Development Design for the Health System in Vietnam to 2010 and Vision by 2020," which all set emerging and reemerging infectious disease control as a major task.

<Consistency with the Development Needs of Viet Nam at the Time of Ex-Ante Evaluation and Project Completion >

Both projects were consistent, from the time of ex-ante evaluation to the time of project completion, with the need to strengthen the ability of biosafety and diagnostic technology of laboratories nationwide, which was a prerequisite for establishing a prompt and effective infection prevention/control system in Viet Nam.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

In "Country Assistance Program for the Socialist Republic of Viet Nam" (2004), health and medical care development was one of the targeted areas of one of the three pillars, "improvement in lifestyle and social aspects." In "Country Assistance Program for Viet Nam" (2009), the following priority areas are listed among priority areas of "Improvements in Living and Social Conditions and Corrections of Disparities," one of the four pillars: "policy and institutional improvements and capacity development of human resources that are responsible for the formulation and implementation of policies based on the Ministry of Health (MOH) and core medical institutions at the central level," "strengthening health and medical care system at the provincial level, with an emphasis on dissemination and development of good practices." Also, the Program specifically states the importance of cooperation with NIHE for infectious disease control.

<Evaluation Result>

In light of the above, the relevance of this JICA intervention is high.

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the time of Project Completion>

The Project Purpose of the JICA intervention was achieved, i.e., the capacity for laboratory network in Viet Nam to examine highly hazardous infectious pathogens was developed, by the end of the cooperation period. During the Phase 1 period, NIHE acquired the capacity to examine highly hazardous infectious pathogens in the BSL-3 laboratories. During the Phase 2 period, capacity development of national, regional and provincial laboratories was realized as planned. As a result, the number and kinds of diagnosable pathogens increased at NIHE, RIs, and the pilot PCPMs. Also, the number of laboratories satisfying biosafety standards (the national biosafety standards) and quality assurance (ISO17025: an international standard on general requirements for the competence of testing and calibration laboratories or ISO15189: an international standard on requirements for quality and competence of medical laboratories) increased.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

The effects of the JICA intervention have continued to the time of ex-post evaluation. The number and kinds of diagnosable pathogens have been generally maintained at each category of the target institutions, while individual institutions showed some fluctuations. For example, Nghe An PCPM decreased the number of diagnosable pathogens from 6 to 4. According to the PCPM, it was because recently, they had not received training related to anthrax, rabies, histoplasma, and thus they were not so confident to diagnose those pathogens. Also, PIHCMC decreased the number from 8 to 7 as there was no anthrax in the region. The number of laboratories satisfying biosafety and quality assurance has kept increasing. According to Decision No.103/2016/ND-CP, all laboratories studying microorganisms with a

² The ex-post evaluation of the grant aid project was conducted in JFY2011.

risk of causing infectious diseases to human, have to declare of satisfaction of national biosafety standards level 1 or level 2; therefore the number of laboratories satisfying the national biosafety standards has been increased significantly in comparison with the time of project completion. There are many institutions that 100% of laboratories have been accredited with the national biosafety standards. According to interviews with some of these institutions, the training conducted by this project contributed to such increased accreditations through better documentation systems, increased number of staff with biosafety certificates, and improved biosafety activities.

Regarding the continuation of the BSL-3-related project effects on NIHE, (1) the number of registered users and the number of investigations and researches on BSL-3 pathogens, (2) the number of diagnoses, decreased recently. According to NIHE, the reasons of (1) are as: ① retirement/job changes or study abroad for master/doctor degrees of some staffs, ② decrease in external support as Viet Nam shifted to middle-income countries, ③ bidding mechanism for research that became more complicated than before, which decreased the research budget, the reasons of (2) are as : ① no recent epidemic of highly hazardous infectious pathogens, and ② improved capacity of PCPMs, which reduced their need to send pathogens to NIHE. Despite above situation, BSL-3 laboratories' diagnosis capacity has been maintained in terms of satisfaction of biosafety and quality assurance standards and emergency response for epidemic. Because NIHE organizes regularly ① training for hazardous infectious pathogens examination, emergency response and evacuation, ② inspections and ③ well management of BSL-3 laboratories by record of operation and maintenance. Besides, core human resource for biosafety, quality assurance and examination of hazardous infectious pathogens are still remained.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal of the JICA intervention has been achieved by the time of ex-post evaluation, i.e., the epidemic caused by highly hazardous infectious pathogens has been controlled. The cases of cholera, plague, and Highly Pathogenic Avian Influenza (HPAI) were minimized, and there is no case of these diseases recently. The number of cases and deaths caused by influenza, Hand, Foot, and Mouth Disease (HFMD), measles, and anthrax has been steadily decreased while the incidents by rabies have been small improved over five years. According to NIHE, RIs, and PCPMs interviewed, it is not easy to distinguish the contribution of this project and other external support or the Vietnamese side's own effort to the attainment. In addition, other factors, such as a network between hospitals and Centers for Disease Control (CDCs) and the improved functions of hospitals and health centers, can affect the result. However, it is clear that after the project completion, the speed of examining pathogens among the institutions increased much, which has helped faster identification and confirmation of epidemic and therefore, better prevention of the spread of an epidemic.

<Other Impacts at the time of Ex-post Evaluation>

No negative impacts of the JICA intervention have been observed. Other positive impacts than already mentioned include the following. (1) Impact on non-pilot PCPMs: NIHE, RIs, and the pilot PCPMs have utilized the acquired knowledge and conducted training, instruction, monitoring and evaluation of lower-level testing institutions about biosafety and examination of highly-hazardous infectious pathogens. For example, besides the pilot PCPMs (Dak Lak, Gia Lai) in its coverage area, TIHE has also conducted training about biosafety for other non-pilot PCPMs (Kon Tum and Dak Nong) or district level institutions on preventive medicine. As a result, Kon Tum PCPM was highly evaluated by TIHE in terms of examination skill, and biosafety activities. (2) Impact on neighboring countries: There are some cases that PCPMs tested samples from other countries such as Cambodia. (3) Decreased reliance on NIHE by PCPMs as mentioned above. (4) NIHE's establishment of the Center of Laboratory Quality Assurance and Calibration (CLQAC) based on the training and equipment related to the BSL-3 laboratories provided under this JICA intervention. This NIHE CLQAC is the first institute under MOH that can provide calibration services. So far, NIHE CLQAC has provided calibration services for many medical institutes in 28 provinces in North as well as over ten provinces in the South. This success was recognized and highly evaluated by MOH. Upon a foundation built by this JICA intervention, MOH and other donors (e.g., ADB, WHO) has continued to invest in developing and improving CLQAC for NIHE, PINT, and PIHCMC.

<Evaluation Result>

Therefore, the effectiveness/impact of the JICA intervention is high.

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results																																																												
(Project Purpose) Capacity for laboratory network in Vietnam to examine highly hazardous infectious pathogens is developed.	Indicator 1: Number and kinds of pathogens examined in NIHE, Regional Pasteur/ Hygiene and Epidemiology Institutes (RIs) and pilot PCPM is increased.	Status of the Achievement: achieved (continued) (Project Completion) (Ex-post Evaluation) Target pathogens: 1) anthrax, 2) cholera, 3) influenza, 4) plague 5) rabies, 6) histoplasma, 7) rickettsia, 8) measles, 9) HFMD, 10) Ebola Number of the target pathogens that can be diagnosed/total number of the target pathogens																																																												
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<p>Indicator 2: Number of laboratories satisfying biosafety and quality assurance standards in NIHE, regional institutions and pilot PCPM is increased.</p>	<p>Status of the Achievement: achieved (continued) (Project Completion) Number of laboratories of the target institutions satisfying biosafety and quality assurance standards / total number of laboratories</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">(a) Satisfying the national biosafety standards</th> <th colspan="5">(b) Certified by ISO17025 or ISO15189</th> </tr> <tr> <th>2013</th> <th>2014</th> <th>2015</th> <th>2011</th> <th>2012</th> <th>2013</th> <th>2014</th> <th>2015</th> </tr> </thead> <tbody> <tr> <td>NIHE total</td> <td>1/6</td> <td>5/6</td> <td>6/6</td> <td>0/6</td> <td>2/6</td> <td>3/6</td> <td>3/6</td> <td>3/6</td> </tr> <tr> <td>RIs total</td> <td>0/12</td> <td>6/12</td> <td>8/12</td> <td>6/12</td> <td>6/12</td> <td>6/12</td> <td>7/12</td> <td>7/12</td> </tr> <tr> <td>Pilot PCPMs total</td> <td>0/10</td> <td>5/10</td> <td>9/10</td> <td>2/10</td> <td>5/10</td> <td>5/10</td> <td>6/10</td> <td>6/10</td> </tr> </tbody> </table> <p>(Ex-post Evaluation) Number of laboratories of the target institutions satisfying biosafety and quality assurance standards / total number of laboratories</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="4">(a) Satisfying the national biosafety standards</th> <th colspan="4">(b) Certified by ISO17025 or ISO15189</th> </tr> <tr> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019</th> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019</th> </tr> </thead> <tbody> <tr> <td>NIHE total</td> <td>28/28</td> <td>28/28</td> <td>23/23</td> <td>23/23</td> <td>6/28</td> <td>12/28</td> <td>15/23</td> <td>15/23</td> </tr> <tr> <td>RIs total</td> <td>17/25</td> <td>23/25</td> <td>23/25</td> <td>23/25</td> <td>16/25</td> <td>17/25</td> <td>19/25</td> <td>19/25</td> </tr> <tr> <td>Pilot PCPMs total</td> <td>30/40</td> <td>30/40</td> <td>30/40</td> <td>30/40</td> <td>10/40</td> <td>12/40</td> <td>14/40</td> <td>14/40</td> </tr> </tbody> </table> <p>The total number of laboratories collected at the time of ex-post evaluation is very different from the one presented in “Project Completion” above (data collected in the terminal evaluation) possibly due to the following reasons. 1) The terminal evaluation might have counted the number of laboratories related to the target pathogens of this project only. 2) Many provincial centers were combined into CDC (See “Institutional Aspect” below).</p>		(a) Satisfying the national biosafety standards			(b) Certified by ISO17025 or ISO15189					2013	2014	2015	2011	2012	2013	2014	2015	NIHE total	1/6	5/6	6/6	0/6	2/6	3/6	3/6	3/6	RIs total	0/12	6/12	8/12	6/12	6/12	6/12	7/12	7/12	Pilot PCPMs total	0/10	5/10	9/10	2/10	5/10	5/10	6/10	6/10		(a) Satisfying the national biosafety standards				(b) Certified by ISO17025 or ISO15189				2016	2017	2018	2019	2016	2017	2018	2019	NIHE total	28/28	28/28	23/23	23/23	6/28	12/28	15/23	15/23	RIs total	17/25	23/25	23/25	23/25	16/25	17/25	19/25	19/25	Pilot PCPMs total	30/40	30/40	30/40	30/40	10/40	12/40	14/40	14/40		
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<p>Indicator 3: Numbers of registered researchers and actual users working with BSL-3 pathogens as well as number of diagnosis/ investigation/ research performances increase at NIHE.</p> <p>* This indicator is originally Indicator of Phase 1's Overall Goal.</p>	<p>Status of the Achievement: achieved (partially continued) (Project Completion) (Ex-post Evaluation) Number of researchers and users working with BSL-3 pathogens in NIHE</p> <table border="1"> <thead> <tr> <th></th> <th>2015</th> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019 (-June)</th> </tr> </thead> <tbody> <tr> <td>No. of registered researchers at NIHE total</td> <td>28</td> <td>28</td> <td>28</td> <td>28</td> <td>29</td> </tr> <tr> <td>No. of registered users of NIHE Biosafety and Quality Management Department</td> <td>8</td> <td>13</td> <td>8</td> <td>8</td> <td>5</td> </tr> </tbody> </table> <p>Number of diagnoses on BSL-3 pathogens in NIHE</p> <table border="1"> <thead> <tr> <th>Pathogen</th> <th>2015</th> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019 (-June)</th> </tr> </thead> <tbody> <tr> <td>Rabies & lyssavirus</td> <td>1,300</td> <td>900</td> <td>800</td> <td>300</td> <td>250</td> </tr> <tr> <td>B. anthracis</td> <td>150</td> <td>200</td> <td>180</td> <td>200</td> <td>150</td> </tr> <tr> <td>Influenza</td> <td>280</td> <td>280</td> <td>270</td> <td>270</td> <td>250</td> </tr> <tr> <td>M. tuberculosis</td> <td>800</td> <td>1,200</td> <td>360</td> <td>550</td> <td>220</td> </tr> <tr> <td>Total</td> <td>2,530</td> <td>2,580</td> <td>1,610</td> <td>1,320</td> <td>870</td> </tr> </tbody> </table> <p>Number of investigations and researches on BSL-3 pathogens in NIHE</p> <table border="1"> <thead> <tr> <th>Pathogen</th> <th>2015</th> <th>2016</th> <th>2017</th> <th>2018</th> <th>2019 (-June)</th> </tr> </thead> <tbody> <tr> <td>Rabies</td> <td>5</td> <td>4</td> <td>4</td> <td>3</td> <td>4</td> </tr> <tr> <td>Special Bacteria</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Tuberculosis bacteria</td> <td>3</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> </tr> <tr> <td>Influenza</td> <td>4</td> <td>4</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Total</td> <td>14</td> <td>13</td> <td>11</td> <td>9</td> <td>10</td> </tr> </tbody> </table>		2015	2016	2017	2018	2019 (-June)	No. of registered researchers at NIHE total	28	28	28	28	29	No. of registered users of NIHE Biosafety and Quality Management Department	8	13	8	8	5	Pathogen	2015	2016	2017	2018	2019 (-June)	Rabies & lyssavirus	1,300	900	800	300	250	B. anthracis	150	200	180	200	150	Influenza	280	280	270	270	250	M. tuberculosis	800	1,200	360	550	220	Total	2,530	2,580	1,610	1,320	870	Pathogen	2015	2016	2017	2018	2019 (-June)	Rabies	5	4	4	3	4	Special Bacteria	2	2	2	2	2	Tuberculosis bacteria	3	3	3	2	2	Influenza	4	4	2	2	2	Total	14	13	11	9	10
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Source: Terminal Evaluation Report; Questionnaires answered from NIHE, RIs, and PCPMs; Statistical Yearbook about infectious diseases (2013-2018)

3 Efficiency

Both project cost and project period of the JICA intervention exceeded the plan (ratio against the plan: 127% and 119%, respectively). The project period of Phase 1 was extended mainly to catch up with a delay in the construction of the BSL-3 laboratories and to provide more advanced training for NIHE to meet the international standards better. The Outputs of the intervention were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

The Government of Viet Nam and MOH have updated, issued, and implemented many policies, such as Decision No.103/2016/ND-CP mentioned above, regarding biosafety and examination management.

<Institutional Aspect>

The organizational structures of the laboratory network among NIHE, RIs, and PCPMs is confirmed as sufficient for biosafety and examination of highly hazardous pathogens and operation of laboratory facilities and equipment, as there is a clear demarcation of responsibility and functions. The network is functioning in terms of training about biosafety and examination, support for infectious diseases examination (e.g., provision of reagents, conduct of examinations for PCPMs), and support for infectious disease prevention (e.g., provision of directions on prevention and monitoring of the epidemic in provinces). Although the consistent data on the number of staff allocated for each task could not be collected, the interviewed institutions confirmed that the workforce was sufficient for biosafety and examination. They also said that in the high season of pathogens, the laboratory staff related to those pathogens might be a bit overload; however, with support from other departments colleagues or receive overtime financial support, they still could handle the task.

For maintenance of laboratory facilities and equipment, NIHE, PIHMC, and PINT do part of maintenance by themselves (at their own CLQAC and their own biosafety & quality management department), while all other institutions outsource maintenance to other CLQAC. There are challenges, although found only in some PCPMs, that the information sharing among the laboratory network as to where to contact in case of breakdown of equipment or equipment not fully functioning.

Currently, some PCPMs (e.g., Dak Lak, Can Tho, and Dong Nai) are implementing or planning a merger of the PCPM into the CDC so that the structure and workforce could be adjusted. With this change, the number of staff allocated for laboratories is expected to increase with laboratory staff from other centers (HIV/AIDS prevention center, Reproductive health center, and so on). All interviewed institutions stated that there would be no serious issues with the merger, but positive aspects such as the sharing of equipment and facilities and quicker decision-making were expected.

<Technical Aspect>

A majority of the counterpart personnel of this JICA intervention are still working on examination of highly hazardous infectious pathogens. Moreover, many training courses regarding biosafety and examination of highly hazardous infectious pathogens have been conducted continuously. Regarding the maintenance of the equipment, most of the institutions outsource maintenance and calibration, as explained above, and therefore not many training courses related to maintenance has been conducted. However, NIHE has a plan to develop training materials and conduct a training course related to management of equipment and facilities for laboratories staffs (users) and technical engineer in institutes of preventive medicine by 2020. The reference documents/materials developed under this JICA intervention (such as the SOPs) have been used and updated for new techniques to optimize the laboratory process. The majority of the equipment procured under this JICA intervention has still been used and maintained or calibrated (some were broken but repaired). There is also a voice that, they're facing with difficult of maintenance due to the authorized agency or maintenance service provider of some type of equipment not available in Vietnam. Besides, approximately 2% (8/322) of the total number of equipment items have been broken and no longer in use. The reasons for such equipment kept unrepaired include some equipment has reached or is reaching the end of service life or lack of maintenance knowledge & skill, contact information of authorized agency or maintenance service provider. Some PCPMs (e.g., Nghe An, Dak Lak) have taken countermeasures such as the use of the same kind of equipment so that the broken equipment would not affect their operation and request for budget to the Department of Health (DOH) of the province.

<Financial Aspect>

NIHE and RIs have allocated sufficient budget from the national budget (MOH) for proper undertaking of (i) biosafety, (ii) examination of highly hazardous infectious pathogens, (iii) operation and maintenance (O&M) of laboratory facilities and equipment, and (iv) training related to (i) to (iii). However, PCPMs, relying much on a local budget (DOH) besides the funds for the National Target Program and some support from donors, have limited funds for the above-mentioned tasks (i) to (iv).

Expenditure budget of NIHE and RIs allocated from MOH for Preventive medicine, National Target Programs, and Training (Unit: million VND)

	2017	2018	2019
NIHE			
- Preventive medicine	67,730	93,320	69,800
- National Target programs	0	385,658	412,850
- Training	350	290	280
PIHMC			
- Preventive medicine	48,360	47,770	44,020
- National Target programs	0	8,271	3,200
- Training	40	30	30
TIHE			
- Preventive medicine	48,270	49,420	50,800
- National Target programs	0	4,300	2,360
- Training	0	0	0
PINT			
- Preventive medicine	46,410	46,900	47,540
- National Target programs	0	6,130	3,040
- Training	90	0	0

Source: MOH

Summary of the budget available to the pilot PCPMs related to biosafety and examinations of highly hazardous pathogens: the range of annual amount, 2016-2019 (Unit: million VND)

	(i) Biosafety	(ii) Examination of highly hazardous pathogens	(iii) O&M of laboratory facilities and equipment	(iv) Training related to (i) to (iii)
Local budget	0-350	0-300	0-200	0-100
Self-income	0-60	0-60	0-40	0-100

Source: Questionnaire answered by PCPMs

<Evaluation Result>

In light of the above, some problems have been observed in terms of the institutional, technical and financial aspects of the implementing agency. Therefore, the sustainability of the effectiveness through this JICA intervention is fair.

5 Summary of the Evaluation

This JICA intervention, consisting of Phase 1 and Phase 2, 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 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.

Considering all of the above points, this JICA intervention is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

(1) For NIHE, RI, PCPMs

- It is recommended to consider strengthening network of sharing information related to maintenance, repair and supporting services of equipment among them.

(2) For Provincial DOH

- It is recommended to secure necessary budget for PCPMs in order to strengthen capacity for biosafety and examination.

Lessons Learned for JICA:

- In order to secure proper and timely maintenance of equipment, it is necessary to carefully consider availability of maintenance service for equipment in the recipient country at timing of deciding equipment and its specification.
- It should be considered to strengthen capacity of CLQAC of NIHE and PIHCMC, and to provide training for PCPMs to equip basic O&M of equipment in collaboration with CLQAC in the project period.



Staff of TIHE is using the Safety Cabinet.



Staff of Dak Lak PCPM is using the Vacuum Filter System.