Ex-Post Project Evaluation 2017: Package II-3 (Myanmar)

November 2018

JAPAN INTERNATIONAL COOPERATION AGENCY

Nathalie Management Consulting Inc.

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Republic of the Union of Myanmar

FY2017 Ex-Post Evaluation of Japanese Grant Aid Project
"The Project for Improvement of Medical Equipment in Hospitals in Yangon and Mandalay"

External Evaluator: Ryoto Uchida, Kaihatsu Management Consulting, Inc.

0. Summary

This project was implemented for the objective to achieve expansion and quality enhancement in the medical services at the five top-referral (tertiary) medical facilities in the Mandalay and Yangon by improving the medical equipment at the facilities, thereby contributing to improvement of the referral function.

The relevance is high. The implementation of this project is consistent with the development policy in the health sector of Myanmar focusing on the quality enhancement of hospital medical services, the development needs to enhance the medical services and efficiency by improving the medical equipment, and Japan's ODA policy prioritizing the aid to improve the people's life swiftly by improvement in the health and medical services, in the condition where risky operations were performed with the decrepit medical equipment while the nurses were insufficient.

The efficiency is high. Both the project cost and the project period are within the plan. The procurement and the installation of the medical equipment were all completed as planned.

The actual values and the increase ratios exceeded the targets for all the target hospitals on all the operation indicators, such as the number of operations, the number of diagnostic examinations and the number of treated patients (except for the indicators on which the target and actual values cannot be compared). In particular, a variety of the diagnostic instruments and endoscopic surgical instruments contributed to accurate diagnosis and reduction of surgical risk, while the automatic monitoring / nursing equipment enabled acceptance of more patients in ICU and SBCU. The avoidance of patient transfer between the tertiary hospitals and the life-saving of super-premature babies are recognized as the examples at the individual target hospitals to demonstrate "improvement in the referral system" that were not available before but are available now. The emergence of these effects was brought as planned by implementation of the project. Therefore, effectiveness and impacts of the project are high.

Even though there is no major problem with the operation, there exist serious problems with the maintenance of equipment procured by the project. This is due to inadequate organization, the shortage of biomedical engineers[1] (hereinafter referred to as "BMEs") and the insufficient development capacity to improve the organization. In the current maintenance status, it is worrying that the procured equipment may become unusable earlier than the expected life for use, if the status is not improved. Major problems have been observed in terms of the organizational aspect and current status regarding maintenance for this project. Therefore, sustainability of the project effects is low.

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

[1] A scientific field combining medicine and engineering to apply engineering to medicine, or an engineer specialized in this field

1. Project Description

Project Location Map

Mandalay General Hospital

Procured CT Scanner in the above hospital

1.1. Background

At the planning time of this project, the health and medical sector in Myanmar was in the tight budgetary condition that sufficient budgetary actions were not taken, although the government was working on quality enhancement of the hospital care services and increase of the hospital beds among others. In this country, the top-referral hospitals in Mandalay and Yangon played an important medical-service role in taking care of the serious patients who could not be treated in other hospitals. However, medical equipment at these hospitals was insufficient or decrepit causing frequent failures those days, so that enhancement of the medical services by improving equipment was an urgent issue. In addition, it was also necessary to strengthen the maintenance system in order to use the medical equipment safely for a long time.

Considering this situation, this project was implemented from 2013 in response to a request from the government, so as to improve the medical equipment and provide technical guidance for the maintenance capacity development. Five target hospitals were selected by priority from among the top-referral hospitals in Mandalay and Yangon. These are Mandalay General Hospital (hereinafter referred to as "MGH"), Mandalay Central Women's Hospital (hereinafter referred to as "MWH"), Mandalay Pediatric Hospital (hereinafter referred to as "MPH"), Yangon Central Women's Hospital (hereinafter referred to as "YWH"), and Yangon Pediatric Hospital (hereinafter referred to as "YPH").

1.2. Project Outline

The objective of this project is to achieve expansion and quality enhancement in medical services at the five top-referral (tertiary) medical facilities in Mandalay and Yangon by improving medical equipment at the facilities, thereby contributing to improvement of the referral function.

G/A Grant Limit / Actual Grant Amount	1,140 million yen / 1,061 million yen
Exchange of Notes Date / Grant Agreement Date	March 2013 / March 2013
Executing Agency	Ministry of Health and Sports
Project Completion	November 2014
Main Contractor	Mitsubishi Corporation
Main Consultant	International Total Engineering Corporation (ITEC)
Basic Design	June 2012 - March 2013
Related Projects	Technical Cooperation: The Project for Human Resource Development of Medical Engineering (2018 - 2023) Senior Overseas Volunteers: Medical Equipment (2016) Japan Overseas Cooperation Volunteers: Medical Equipment (2017-2018)

2. Outline of the Evaluation Study

2.1. External Evaluator

Ryoto Uchida (Kaihatsu Management Consulting, Inc.)

2.2. Duration of Evaluation Study

This ex-post evaluation study was conducted in the following schedule.

Duration of the Study: August 2017 – November 2018

Duration of the Field Study: December 2 – 14, 2017 and March 12 – 16, 2018

3. Results of the Evaluation (Overall Rating: B[2])

3.1. Relevance (Rating: ③[3])

3.1.1. Consistency with the Development Plan of Myanmar

The objective of this project is consistent with the country's long-term development policy at both time of the planning and the ex-post evaluation, since the quality enhancement of health and medical services is determined to be a goal by both Myanmar's long-term health development plans known as *Myanmar Health Vision 2030* at the planning and *National Comprehensive Development Plan 2011-2031 (Health Sector)* at the ex-post evaluation. Furthermore, both of the *National Health Plan 2006-2011* and the *National Health Plan 2017-2021*, which are the five-

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

[3] ③: High, ②: Fair, ①: Low

year health development plans at the respective time points, determine the quality enhancement of hospital medical services to be a priority. Therefore, the objective of this project to achieve expansion and quality enhancement of medical services at the top-referral hospitals by improving the medical equipment is consistent with the development policy in this country at the time of the planning and the ex-post evaluation.

3.1.2. Consistency with the Development Needs of Myanmar

The 5 target hospitals, selected at the planning time as described in "1.1 Background", still continue playing an important role in medical services of Myanmar as the top-referral hospital in the two largest cities at the ex-post evaluation time.

At the planning time, the target hospitals needed the immediate measures due to their insufficient or decrepit medical equipment, as they had serious problems to be described hereinafter. First, the surgery was being performed with high risk because the diagnostic instruments using X rays and ultrasound and the endoscopic instruments were insufficient or decrepit. Therefore, it was necessary to update these instruments to enhance the safety of surgery. Next, due to the shortage of nurses, patients could not be accepted adequately, especially in ICU and SBCU. Therefore, it was necessary to improve efficiency with the introduction or increase of automatic monitoring / nursing instruments. Thus, the demand and urgency for improvement of equipment to enhance the medical services and efficiency were high at the target hospitals.

The automatic monitoring / nursing instruments, procured to meet the aforementioned demand, are utilized 365 days a year with no spare instruments at ICU and SBCU. In order to cope with the increase in hospital beds since the planning time and conduct their timely inspection, more instruments are still needed at the ex-post evaluation time. In addition, the automatic ventilators for infants and protectors for a mobile X-ray machine are also needed among others because of their frequent use. Therefore, the improvement of medical equipment is a continuous need even at the ex-post evaluation time.

As mentioned above, the objective of this project is consistent with the development needs of the country at both time of the planning and the ex-post evaluation.

3.1.3. Consistency with Japan’s ODA Policy

At the planning time, Japan's ODA policy *Economic Cooperation Policy with Myanmar (April 2012)* identified the improvement in health and medical services to be a specific measure in a priority sector of the aid to improve people’s lives. This was to achieve the objective of promoting reform efforts towards democratization, national reconciliation, and sustainable development. This project is consistent with this ODA policy of Japan.

This project has been highly relevant to the country’s development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

3.2. Efficiency (Rating: ③)

3.2.1. Project Outputs

The outputs in terms of the equipment procurement and the soft component were as planned on the whole, as shown below. The changes in the outputs were inevitable, but their influences were minor.

<Target top-referral hospitals>

3 hospitals in Mandalay: MGH, MWH, MPH

2 hospitals in Yangon: YWH, YPH

<Equipment Procurement>

The procured equipment consists of 120 items in total, mainly including X-ray diagnostic machines, ultrasound diagnostic machines, CT scanners, patient monitoring instruments, ventilators, autoclaves, operation tables, and centrifuges. Its summary is shown in the table below, although the units of equipment installed vary according to the functions of the hospitals.

Unit of equipment installation	Main equipment
Radiology / Emergency & Outpatients	X-ray diagnostic machines, ultrasound diagnostic machines, CT scanners
ICU / SBCU	patient monitoring instruments, ventilators, autoclaves
Operation Room	operation tables, mobile X-ray machines, autoclaves
Blood Bank / Laboratory	centrifuges

< Reduction in the equipment>

2 pH meters were unavoidably cut down due to weakened JPY.

<Change in the equipment item>

A spectrophotometer was replaced with an automatic chemical analyzer. It was due to the model no longer manufactured and for better operation.

The impact of these changes was minor because MWH, where these instruments were to be installed, accepted the changes for the unavoidable reasons.

<Soft Component>

In the soft component of this project, the Central Medical Store Depot (hereinafter referred to as "CMSD") was instructed to properly supervise and guide the target hospitals on the maintenance of medical equipment. In addition, it was instructed to produce various standard forms and give notice and notification to the hospitals with them.

The target hospitals were instructed to appoint the responsible person for maintenance and share the common forms, and properly conduct daily maintenance work. In addition, they were instructed to share common inventory forms and develop the annual plan to procure consumables and replacement parts on their own.

Planning time	Ex-post evaluation time
 Ultrasound diagnostic machine at MWH	 Ultrasound diagnostic machine in MPH Radiology Unit
 Fixed type of X-ray diagnostic machineat YPH	 Mobile X-ray diagnostic machine installed in MGH Operation Room
 SBCU at MPH	 SBCU at MWH (with automatic monitoring / nursing instruments)
 Endoscopes in the storage shelf at MGH (all decrepit and unusable)	 A set of Endoscopic components installed in MGH Uro Surgery Unit

Source: Preparation Survey Report of this project (February 2013) for the photos at the planning time
The photos at the ex-post evaluation time were taken by the external evaluator in December 2017.

3.2.2. Project Inputs

3.2.2.1. Project Cost

The planned project cost was 1,140 million yen on the Japanese side and 161 million kyats (about 15 million yen) on the Myanmar side, totaling 1,155 million yen. The actual cost on the Japanese side was 1,061 million yen. All that could be confirmed about the resulted cost on the Myanmar side was only 10.2 million kyats (about 1.1 million yen) which was banking fees disbursed by the Department of Medical Services (hereinafter referred to as "DoMS"). The renovation and construction costs spent by the hospitals to install the procured equipment were disbursed out of the general budget allocated to each hospital, so that the amount could not be identified. The planned and actual costs were only compared for project costs on the Japan side, because the project cost on the Myanmar side is less than 2% of the total cost even in the plan. As a result, the actual project cost was 1,061 million yen and maintained within the plan (92% of the plan).

The actual cost on the Japanese side was less than planned due to the tendering result. No efficiency problem occurred as necessary construction by the hospitals to install and operate the procurement equipment was completed in a timely manner.

3.2.2.2. Project Period

The actual project period was the same as the planned period of 21 months, from March 2013 to November 2014 (100% of the plan). The actual period to implement the soft component was 12 months which was also the same as planned.

Both the project cost and project period were within the plan. Therefore, efficiency of the project is high.

3.3. Effectiveness and Impacts[4] (Rating: ③)

3.3.1. Effectiveness

3.3.1.1. Quantitative Effects

[Operation Indicators]

As shown in the following tables, the actual values and increase ratios exceeded the targets on all the operation indicators for all the target hospitals (except for the indicators with + or * on which the target and actual values cannot be compared).

[4] Sub-rating for Effectiveness is to be put with consideration of Impacts.

(1) MGH

Table 1 Operation Indicators for MGH

	Baseline	Target	Increase	Actual			Increase
	2011	2017		2014	2015	2016	
		3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion	
# of Operations	11,631	12,266	5%	19,682	19,263	21,392	84%
# of Ultrasound exams	11,751	12,565	7%	21,269	23,038	28,295	141%
# of X-ray exams	41,422	45,742	10%	59,567	73,522	78,199	89%
# of Clinical exams	123,430	140,869	14%	196,766	231,530	280,184	127%
# of ICU patients+	434	N.A.	N.A.	560	880	931	115%
# of CT exams	3,081	7,200	134%	2,259	4,935	9,128	196%

Source: JICA Preparation Survey Report for Baseline and Target values, the response of each target hospital for Actual values (However, when a difference was found in the ex-post evaluation survey, the values obtained at the planned time and at the time of evaluation are put in the upper row and in the lower row respectively). Exceptions are added to each table if any. (Common between Table 1 - Table 5)

Notes: Comparison is made between 2016 Actual and 2017 Target values because the 2017 Actual values have not been counted at the hearing time.

+: The indicator which was not listed at the planning time but added and heard at the ex-post evaluation time. Therefore, the Target and Increase values at the planning time are not available.

*: The Actual values only for the procured instrument in this project were available at the ex-post evaluation time. Therefore, they cannot be compared with the Target value which was for the total instruments.

N.A.: Not Available at the ex-post evaluation time for the reasons described in the above notes

#: abbreviation for “number”, exams: abbreviation for “examinations”

（Common between Table 1 - Table 5）

(2) MWH

Table 2 Operation Indicators for MWH

	Baseline	Target	Increase	Actual			Increase
	2011	2017		2014	2015	2016	
		3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion	
# of Operations	4,298	4,552	6%	4,579	5,271	6,189	44%
# of Ultrasound exams	4,836 7,099	9,316	93%	9,937	13,490	18,361	159%
# of X-ray exams* [5]	1,307 0	1,767	35%	9	43	56	N.A.
# of Clinical exams	9,988 15,374	12,283	23%	21,350	31,097	37,515	144%
# of SBCU patients	1,678 1,714	2,185	30%	1,917	2,397	2,412	41%
# of Deliveries	5,750	5,840	2%	6,917	7,853	9,278	61%

Note: The baseline values in the Preparation Survey Report differed a lot from the 2011 values given by the hospital at the ex-post evaluation time. As the hospital confirmed that the latter was correct, it was used for the Actual Increase.

[5] The Baseline and Target values are # of the exams with regular fixed-type x-ray diagnostic machines, while the Actual values are only with the mobile machine (the arm style used during an operation) introduced by this project for the first time. It is also true for MPH. The indicator selected at the planning time was not appropriate since the uses differ.

(3) MPH

Table 3 Operation Indicators for MPH

	Baseline	Target	Increase	Actual			Increase
	2012	2017		2014	2015	2016	
		3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion	
# of Operations	2,171	2,153	-1%	3,830	3,850	4,024	85%
# of Ultrasound exams*	N.A.	1,537	N.A.	635	4,746	4,584	N.A.
# of X-ray exams*[5]	1,841 0	4,262	132%	14	232	285	N.A.
# of Clinical exams	17,810	24,081	35%	33,515	58,172	56,343	216%
# of SBCU patients+[6]	933	N.A.	132%[6]	1,792	2,061	2,213	137%

Note: As MPH opened in August 2011, the Baseline values are set to be the 2012 values given by the hospital at the ex-post evaluation time.

(4) YWH

Table 4 Operation Indicators for YWH

	Baseline	Target	Increase	Actual			Increase
	2011	2017		2014	2015	2016	
		3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion	
# of Operations	9,559 11,631	9,787	2%	14,535	18,185	20,548	77%
# of Ultrasound exams	7,495 11,751	7,733	3%	19,971	20,916	19,026	62%
# of Clinical exams[7]	165,124 123,430	169,017	2%	105,233	143,527	150,626	22%
# of SBCU patients+	N.A. 1,103	N.A.	N.A.	1,746	2,381	3,077	179%

Note: The baseline values in the Preparation Survey Report differed much from the 2011 values given by the hospital at the ex-post evaluation time. As the hospital confirmed that the latter was correct due to the information system introduced, it was used for the Actual Increase.

(5) YPH

Table 5 Operation Indicators for YPH

	Baseline	Target	Increase	Actual			Increase
	2011	2017		2014	2015	2016	
		3 Years After Completion		Completion Year	1 Year After Completion	2 Years After Completion	
# of Operations	4,089	4,734	16%	3,678	5,844	7,936	94%
# of Ultrasound exams	5,177	5,993	16%	4,818	6,751	8,207	59%
# of X-ray exams	11,312	13,095	16%	10,519	14,876	19,130	69%

The transition data of the total number owned by the hospital, and the annual number / days of the operations, and the number procured by this project were also collected from each hospital for each of main procured instruments at the time of ex-post evaluation. As a result of the analysis,

[6] The amount of equipment procured by JICA and number of patients are much more in SBCU than in ICU, so the indicator was switched to the number of SBCU patients. However, the target increase ratio is the value for the number of ICU patients at the planning time.

[7] Although the actual value has not reached the target value due to the note below the table, the increase ratio is much higher than the target (about 11 times).

the number of operations increased after the completion of this project on the whole. The automatic nursing instruments were used 365 days a year without a break. This result also confirmed that the operation effect was high.

3.3.1.2. Qualitative Effects (Other Effects)

It was found in the interviews of the medical staff in the target hospitals at the time of ex-post evaluation that more accurate diagnosis and reduction of surgical risks (avoidance of unnecessary operations and laparotomy) have been achieved due to utilization of the various types of the diagnostic machines and the endoscopic operation instruments. This shows the emergence of the qualitative effect "More accurate diagnosis and more appropriate treatment will be performed." expected at the planning time.

In addition, the introduction or increase in the automatic monitoring and nursing equipment brought by this project, such as monitoring instruments, ventilators, incubators, injection / infusion pumps among others, enabled acceptance of more patients in ICU and SBCU above all, although the number of nurses is still much lower than the approved cadre at each hospital. For example, the ICU patients at MGH and the SBCU patients at MWH, MPH, YWH increased by 115%, 41%, 137%, 101% respectively as ratios to the baseline values for 4 years from the baseline year to 2016. Furthermore, avoidance of laparotomy by the above-mentioned endoscopic operations brought about a reduction in the hospitalization period, allowing more patients to be accepted. These show the qualitative effect of "Expansion and quality enhancement of the medical services by improving the operational efficiency" expected at the planning time.

3.3.2. Impacts

3.3.2.1. Intended Impacts

The impact expected from this project was "Improvement of the referral function". However, the referral system in Myanmar is not to divide patients between different levels of medical facilities, because a patient does not need the reference letter issued at a lower-level medical facility in order to receive medical treatment at a top-referral hospital[8]. Rather, it is to identify the upper-level hospital with which a lower-level medical facility can entrust patients when the treatment beyond its capacity is necessary. Therefore, information such as the number of the referred patients accepted was not available at the target hospitals.

Taking into account the referral system in this country, the expected impact from this project is regarded as reinforcement of the capacity of the upper-level hospitals who should accept the patients when a lower-level medical facility needs the treatment beyond its capacity. This impact has been achieved as described in 3.3.1.2 Qualitative Effects.

In addition, the ex-post evaluation found that some medical functions that had previously been unavailable were made possible at the target hospitals by the implementation of this project, as described below. These examples demonstrate how the capacity of the target hospitals has been

[8] This point is an issue about what the referral system in this country should be.

reinforced to accept patients.

[Avoidance of transfer between tertiary hospitals]

- In MGH, some transplant surgery has become available in its own hospital. Previously, these patients were transferred the far away to a tertiary hospital in Yangon.
- In MWH, blood component transfusion has become available in its own hospital, because the introduction of a centrifuge made it possible to separate each component of transfused blood. Previously, the patients were transferred to MGH.

[Medical functions newly available]

- Saving lives of super-premature babies: Ventilators for neonates made it possible to save some super-premature babies (0.75 kg or less) that was not possible before. In MWH, the survival rate of neonates weighing less than 1 kg was 0% in 2011 but increased to 44.6% in 2016.
- Swift response to emergency patients: With the CT scanner installed at the emergency room center in MGH, it has become possible to swiftly diagnose the emergency patients who require quick treatment. Previously, the emergency diagnosis with a CT scanner was not available, because Radiology Unit had the only one which was fully booked.
- Prevention of cervical cancer: With the laparoscopic operation now available, YWH has become also able to prevent cervical cancer for female patients, in addition to reducing the risk for the patients by avoiding laparotomy surgery.

3.3.2.2. Other Positive and Negative Impacts

(1) Impact on the natural environment: IEE / EIA was unnecessary.

(2) Resident relocation or land acquisition: did not occur.

(3) Other impacts:

Medical treatment is basically free of charge in Myanmar. Therefore, the poor can also visit a top-referral hospital. Although medical treatment with high-cost medical equipment such as CT scanner is charged, the hospitals reduce the payment burden for those who find it difficult to pay by introducing donors to them. Thus this country has the system in which all the people can take examinations and/or operations with the procured equipment in this project. Therefore, the procured equipment is useful in improving the medical care for the poor as well.

In addition, this project improved the medical services for pregnant women and premature babies because the equipment was mainly procured for the hospitals for women and/or children. One of the remarkable examples is saving lives of super-premature babies in MWH with introduction of ventilators for neonates, as described above. In the same hospital, the beneficiaries are also increasing as the number of hospitalized neonates increased from 1,669 in 2013 to 2,789 in 2016. The humanitarian contributions are also confirmed because the neonatal mortality rate decreased from 10.5% to 6.6% for the same period.

Thus, the impacts brought by the implementation of this project include the benefits for the poor and the humanitarian contributions, in addition to the quality enhancement in the medical services, increasing capacity to accept more patients, and medical functions made newly available.

This project has achieved its objectives. Therefore, effectiveness and impacts of the project are high.

3.4. Sustainability (Rating: ①)

3.4.1. Institutional / Organizational Aspects of Operation and Maintenance

3.4.1.1. DoMS

The executing agency of this project is DoMS, which is managed by 4 Deputy Directors General (hereinafter referred to as "DDG") under supervision of the Director General (hereinafter referred to as "DG"). The DDG in charge of Procurement, Supply & Distribution (hereinafter referred to as "PSD") is responsible for procurement and maintenance of medical equipment. The Procurement Division and the Distribution Division (one director supervising both divisions at present) come under this position of PSD DDG newly established in 2015.

The Organization Diagram is shown by Figure 1 as of March 2018. But DoMS plans the reorganization shown in Figure 2.

The Procurement Division is in charge of the equipment procurement, which is done mainly in Yangon. This division is in charge of the equipment maintenance as well. This division also has the important responsibility for capacity development and allocation of BME. So far there has been no educational course to develop the BME capacity in Myanmar (medical engineer development course started in June 2018, as described in 3.4.4.2). Therefore, BMEs are very short. In the new organization, the BME Division will be newly established to take the responsibility to develop BMEs and allocate them to the local offices and the tertiary hospitals which will be transferred from the Procurement Division.

The Distribution Division is in charge of distributing consumables and medicines. Under its supervision, CMSD in each location carries out the distribution and the inventory management.

CMSD is located in Yangon and has its local offices in Mandalay and Taunggyi. Supervised by the Procurement Division in addition to the Distribution Division, they play the role as a local office to supervise and advise the equipment maintenance in each region. However, they are not playing the role for the maintenance, having few such experts. In the new organization, the local offices of the BME Division, which will be newly established, are to perform this role expected of CMSD.

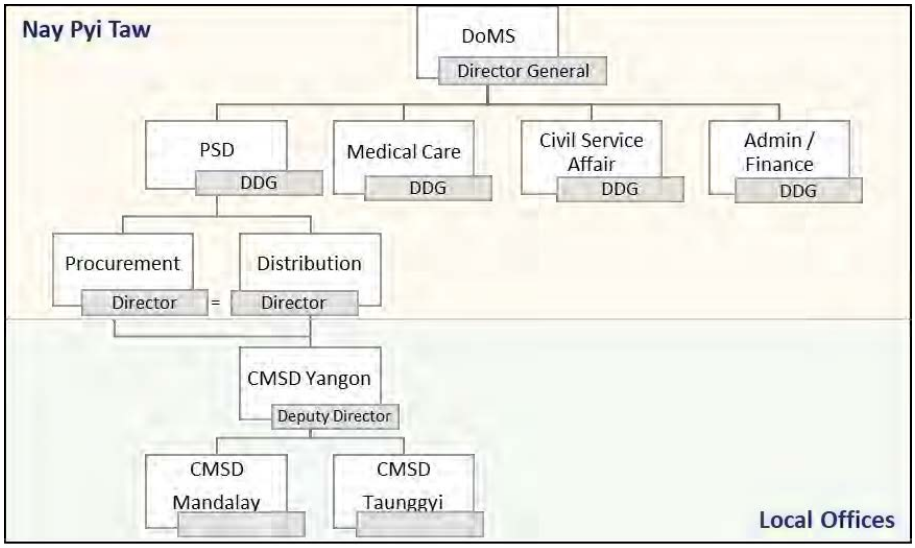


Figure 1 DoMS Organization Diagram (Present)

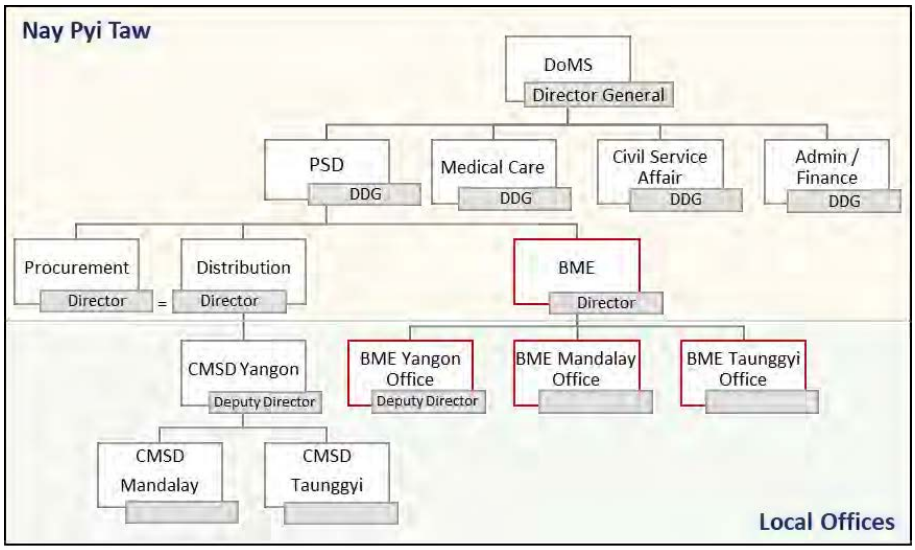


Figure 2 DoMS Organization Diagram (New)

3.4.1.2. Target Hospitals

The responsibility for equipment operation falls on the head of each medical unit under the hospital head. The healthcare workers in each medical unit know well how to use the equipment. There are no particular problems with operation of the procured equipment.

In respect to equipment maintenance, each hospital, except for YWH, has no specific person assigned to control it. Each medical unit individually liaises with the hospital head (Senior Medical Superintendent) for the procedure to apply for the approval of repairs among others. Exceptionally, only YWH has a maintenance supervisor who is the contact point for such approval requests. However, this maintenance supervisor, who has made a practical contribution, has recently moved to the Procurement Division in Nay Pyi Taw (planned to be shifted to the BME Division in the new organization).

As described above, at the time of the ex-post evaluation, no organizational problem was found particularly concerning operation of the procured equipment. However, a number of the problems were found in the organizational aspect of maintenance, such as shortage of BMEs and absence of maintenance supervisors, which are causing the major problems described in 3.4.4.2 Status of Maintenance. DoMS recognizes these problems and is trying to improve them through the organizational changes.

3.4.2. Technical Aspects of Operation and Maintenance

3.4.2.1. Technical Aspects of Operation

For most of the procured equipment, there are no technical problems concerning operation. As an exception case, however, the CO_2 incubator (MPH) and the electrophoresis (hemoglobin) device (YPH) introduced in Laboratory Units have not been used after the transfer of the doctors who worked there at the time of the request for equipment. Although the doctors at the time had the expertise to use these instruments, their successors did not use it because they do not understand the usage.

3.4.2.2. Technical Aspects of Maintenance

The technical problems are as follows, but the fundamental causes lie in the organizational problem and shortage of human resources, as described above (the details described in 3.4.4.2 Status of Maintenance).

- CMSD does not have expertise to give useful advice on repair and procurement of parts and consumables.
- There is no maintenance supervisor in each hospital, while the doctors and the nurses in each medical unit cannot make appropriate judgments or negotiate price of repairs among others. Particularly, 3 hospitals in Mandalay cannot handle even a simple breakdown with the electric system inside the hospital (detailed in 3.4.4.2) despite the far away location from the medical equipment agencies.

For the above-mentioned organizational reasons, the technical aspects of operation and maintenance are not taken into consideration in determining the sustainability evaluation.

3.4.3. Financial Aspects of Operation and Maintenance

3.4.3.1. DoMS

As described in 3.4.3.2, the interviews with the target hospitals confirmed that they are provided with the necessary expenses for operation and maintenance in response to the budget applications to DoMS. Therefore, there seem to be few financial problems with DoMS at the ex-post evaluation time.

In addition, Table 6 shows transition of the expenditure for operation and maintenance in

DoMS. The source is the Preparation Survey Report produced for the actual value in fiscal year[9] (FY) 2012 and forecast values for FY2014 and FY2015 as of the planning time, which is the expenditure of the whole Ministry of Health at that time. Responded by DoMS at the ex-post evaluation time (March 2018), the actual values between FY2014 and FY2016 are the expenditure amounts in DoMS (Department of Health until FY2015). In addition, since Department of Health was separated into DoMS and Department of Public Health (DoPH) in terms of the expenditure account in FY2016, the DoPH expenditure was excluded (organizationally separated in April 2015).

Table 6 Expenditure for Operation and Maintenance in DoMS

Fiscal Year	Actual	Account coverage	Forecast at planning	Account coverage	Note
2012	90,057	whole Ministry			
2014	229,907	DoMS + DoPH	132,917	whole Ministry	Project Completion in Nov. 2014
2015	193,292	DoMS + DoPH	161,478	whole Ministry	
2016	146,970	DoMS			Separation of DoPH

Unit: million kyats, Source: Preparation Survey Report, Response of DoMS

The actual amounts exceeded the forecast amounts as of the planning time with regard to the operation and maintenance expenses in FY2014 and FY2015[10]. This fact also confirms that the necessary budget has been secured. The decrease in the actual amount from FY2015 to FY2016 is due to the fact that DoPH was separated from DoMS, so that the amount did not decrease in real terms[11]. With regard to the expenditure of operation and maintenance, no concern is therefore seen about securing the future budget currently.

3.4.3.2. Target Hospitals

With regard to finances of the target hospitals, they do not actually generate their own income, since their revenues are all transferred to the Ministry of Health and Sports, even though charges for the CT examinations and the private room hospitalization are collected from patients. However, from the maintenance budget allocated from DoMS, they can disburse up to about 1 million kyats (about 80,000 yen) per case at their own discretion. For maintenance costs exceeding the discretion amount, they need to apply to DoMS. In most cases this has been approved. However, it was pointed out that the process takes a long time. As no hospitals pointed out shortage of budget allocation, the necessary maintenance costs are paid by DoMS.

At the time of the ex-post evaluation, the blood culture system (MGH) and the automatic chemical analyzer (MPH) introduced in the laboratory units were not used because the reagents were too expensive to come by. However, this seems to be a problem concerning the procedure

[9] A fiscal year starts on April 1 and ends on March 31 for the government organizations in Myanmar until March 2018 (FY2017). However, from October 2018 on, it will start on October 1 and end on September 30.

[10] The exceeded amount is actually more than their simple difference because the actual amount covers only DoMS + DoPH while the forecast amount covers the whole Ministry.

[11] Explained by Finance Director in DoMS. According to this director, the decrease from FY2014 to FY2015 is within the annual fluctuation range.

for equipment selection at the time of planning, rather than a financial problem. At the time of the equipment selection, although the hospital accepted the possibility that the reagent could be expensive, DoMS, who has the authority to approve budget, does not seem to have recognized this possibility. Therefore, when the hospital applied to DoMS for the budget to purchase the reagents, the approval was not given because it was too expensive.

Therefore, the financial problems with regard to the operation and maintenance are considered to be relatively small.

3.4.4. Status of Operation and Maintenance

3.4.4.1. Status of Operation

In this project where a wide range of equipment consisting of 276 items of 120 different types was procured, most of the equipment is being used effectively, as described in 3.3.1 Effectiveness. Under these circumstances, the total of four aforementioned instruments, two of which were not used after the transfer of the doctors who requested the instruments (3.4.2.1) and two others were not used due to the non-availability of expensive reagents (3.4.3.2), are counted as the exceptions.

3.4.4.2. Status of Maintenance

In addition to the above-mentioned problems with the organization being not well-established and shortage of human resources (BME), another problem is due to inadequate response from or closing down of medical equipment agencies. The status regarding the Procurement Division, CMSD, the target hospitals, and the agencies is described below.

<u>Procurement Division of DoMS</u>

Although the shortage of BME was already mentioned as an issue with maintenance even at the planning time, the development of BME is still insufficient at the ex-post evaluation time. Although the Procurement Division is planning to allocate BMEs to CMSD and the target hospitals in order to respond to their various problems and improve their situation, it has not been able to do so due to the shortage of human resources.

In addition, although the Procurement Division could approve the budget for maintenance and/or regular inspection contracts for expensive instruments (e.g., CT scanners), it cannot judge the economic efficiency of such an insurance measure due to shortage of experts. BME is thus required for this role too.

However, since there is no educational course to develop BME as described in 3.4.1.1, even the requirements of BME are not clearly defined. Actually, there are few experts even among so-called BMEs in this division. Most of them are young officials with expertise in general engineering, who are merely BME candidates to be developed from now.

While the shortage of BME is a fundamental problem as described, there is also a problem with the ability to train BME. DoMS has conducted two BME trainings (total of 20 days in 2012, 30 days in 2016) so far. It has been giving 1-2 days OJTs to the officials since 2017, dispatching

them taking an opportunity to install procured equipment. But the trainer is not an official in this division but a specific cooperative agency. Furthermore, in June 2018, a one-year ME development course will start at the University of Medical Technology (UMT) in Yangon with JICA's cooperation (Although it has not started yet as of the time of the local survey, it actually started as planned.). To the questions asked about the requirements of BME in Myanmar to be fulfilled in this regard, the reply of this division implied that such requirements were not specified by then. Not limited to this division, some medical administrators and managers actually misunderstood that BME could repair various medical equipment. Therefore, this division does not seem to have sufficient capacity to develop BME on its own in the present state.

In addition, the demand for BME human resources is not confined to the Ministry of Health and Sports (including the related hospitals). PSD DDG stated the concern "Because medical equipment manufacturers and their agencies, also seeking such human resources, hire them with higher compensation, there are already some cases where some trained officials changed their jobs. So, it is also an issue how to keep the BME after the training.".

In order for the Procurement Division to have capacity to develop BME, it is necessary to start with specifying the practical requirements of BME in this country and having them acknowledged widely.

CMSD

As described in "Institutional / Organizational Aspects of Operation and Maintenance", being the local office of the Procurement Division, CMSD takes the responsibility as supervisor and adviser on equipment maintenance for the hospitals. But it hardly fulfills this responsibility.

In the maintenance training done in the soft component (described later in 3.4.4.3), CMSD Yangon was instructed to collect and centrally manage the equipment information including maintenance. Although this was essentially expected to work effectively, since the hospitals do not recognize that CMSD takes the responsibility as reception window for consultation on maintenance, they never contacted or consulted CMSD. The function to collect and share the information has not been implemented by the time of ex-post evaluation. In order for CMSD to support the maintenance for the hospitals, it is urgent that the Procurement Division develop BME and allocate the necessary human resources there.

Medical equipment agencies

Although the medical equipment agencies are not directly related to this project, a major problem with maintenance has been caused by them making insufficient responses (such as not visiting, taking a long time to visit) or having closed down unexpectedly. This impact was remarkable in Mandalay, which is far from Yangon where many agencies are located.

Since most of the medical equipment manufacturers have exclusive agency contracts, the other agencies often cannot take requests to repair the equipment or obtain the consumables. Nevertheless, in Yangon, the many cases were found where the target hospitals had such requests taken by another agency with which they keep a good relationship. By contrast, in Mandalay, the

agency problem is far more serious, so that some instruments were found not being used due to this problem.

Target hospitals

At most of the target hospitals, each medical unit individually requests the agent for repair and procurement of consumables. It is due to the background that a maintenance supervisor is not assigned in each hospital (except for YWH). Consequently, the following problems are occurring.

- The maintenance information is not shared. As a result, the hospitals cannot negotiate with the agencies effectively, cannot make a measure against the response problem of agencies, and cannot share the measure with other units even if it was made.
- Although electric engineers in the administrative department may support the procedure for repair or others when necessary, they cannot give an effective measure or advice as maintenance of medical equipment is not their expertise.
- There are cases where repair is not arranged because a unit does not know the application procedure for maintenance.

Although each hospital hopes to have a BME allocated to the maintenance supervisor, BMEs have not been allocated because they are short even in the Procurement Division. As an alternative solution, it could be considered to develop the BME capacity from engineers inside the hospitals and assign them to the maintenance supervisors. But it is not realized due to insufficient development capacity of the Procurement Division. These are the reasons why the maintenance supervisor is not allocated. In another aspect, some hospital managers including the senior superintendents misunderstood that a BME could repair various medical equipment inside the hospital. Thus, the concern that they put too high an expectation on BME was perceived.

Regarding the agency problem above, no practical suggestion for improvement was heard from the hospitals. They just hoped for improvements to be made by the agencies themselves. As a result, some instruments were found unused, either because repairs or parts were not available. Particularly at the hospitals in Mandalay, as one of the countermeasures to the agency problem, it is desirable that the electrical failures among others could be handled inside as much as possible. However, without a maintenance supervisor, it is not judged whether they could be handled inside or not.

Maintenance contracts including those for regular inspections are rarely made with the manufacturer agencies even for expensive equipment such as a CT scanner. As far as it could be confirmed, all the concluded maintenance contracts were for the fixed-type digital X-ray diagnostic machine installed in the YPH radiology unit.

Maintenance management was superior in YWH having a maintenance supervisor assigned, in the following aspects, to the other target hospitals having no supervisor.

- The repairs were inspected before contacting the agency, so that the electrical failures among others were repaired inside the hospital. Therefore, unnecessary communication with the agencies was reduced.
- The maintenance supervisor had a wide and strong network with the agencies which was built

up through his duties. He was therefore able to negotiate substitution for the closed agency with other agencies well. Actually, no comment was heard about a repair not being carried out due to closure of an agency.

3.4.4.3. Effectiveness of the Soft Component

In the soft component of this project, the maintenance training was implemented for the purposes to assign the supervisor and learn the management skills, based the problem recognized at the planning time that the maintenance system had not been established. After the training, the results such as "under the maintenance supervisor of the medical equipment, the organization and responsibilities have become clear at each hospital", "the following management skills have been learned", and "it was also motivated to continue the practice" were reported. However, information gathered at the ex-post evaluation time shows that the implementation of the soft component had not contributed to solving the problem identified at the planning time. Regarding the appointment of the maintenance supervisor, apart from YWH, the interviews with the hospitals showed that the mission was actually neither fulfilled nor taken over by the successor because the official position has never been established although the supervisor was appointed in accordance with the training instruction. Therefore, the management practice expected on the maintenance supervisor was not executed. However, the reasons and the background for this were not answered clearly, because most of the senior superintendents and the participants at the implementation time of the soft component had been transferred at the ex-post evaluation time.

Regarding acquisition of management technologies, the positive opinion "how to check the functions of the equipment was learned" was heard in some medical units. Although the training was also conducted on a daily check, it is not implemented since each medical unit was short of staff. There are many medical units checking their equipment only before use, while regular checks would only be done once a month at best. It seemed that the purpose was to avoid a malfunctioning instrument being used for patients rather than to prevent it from breaking down. Although training was also conducted on the maintenance budget planning, this has not been implemented in any hospital. The collection and central management of the equipment information are not implemented by CMSD, as described above.

Few problems were found with the status of operation, as the equipment procured by this project is effectively utilized except for a few instruments. There are however many problems with the status of maintenance as mentioned above. The necessary frequency for repair and parts replacement will increase as the equipment is more utilized in future. Therefore, if the status is not improved, the concern is that the procured equipment may become unusable earlier than the expected life for use. Thus, some serious problems were found with the status of maintenance.

Major problems have been observed in terms of the organizational aspect and current status. Therefore, sustainability of the project effects is low.

4. Conclusion, Lessons Learned and Recommendations

4.1. Conclusion

This project was implemented for the objective to achieve expansion and quality enhancement in the medical services at the five top-referral (tertiary) medical facilities in the Mandalay and Yangon by improving the medical equipment at the facilities, thereby contributing to improvement of the referral function.

The relevance is high. The implementation of this project is consistent with the development policy in the health sector of Myanmar focusing on the quality enhancement of hospital medical services, the development needs to enhance the medical services and efficiency by improving the medical equipment, and Japan's ODA policy prioritizing the aid to improve the people's life swiftly by improvement in the health and medical services, in the condition where risky operations were performed with the decrepit medical equipment while the nurses were insufficient.

The efficiency is high. Both the project cost and the project period are within the plan. The procurement and the installation of the medical equipment were all completed as planned.

The actual values and the increase ratios exceeded the targets for all the target hospitals on all the operation indicators, such as the number of operations, the number of diagnostic examinations and the number of treated patients (except for the indicators on which the target and actual values cannot be compared). In particular, a variety of the diagnostic instruments and endoscopic surgical instruments contributed to accurate diagnosis and reduction of surgical risk, while the automatic monitoring / nursing equipment enabled acceptance of more patients in ICU and SBCU. The avoidance of patient transfer between the tertiary hospitals and the life-saving of super-premature babies are recognized as the examples at the individual target hospitals to demonstrate "improvement in the referral system" that were not available before but are available now. The emergence of these effects was brought as planned by implementation of the project. Therefore, effectiveness and impacts of the project are high.

Even though there is no major problem with the operation, there exist serious problems with the maintenance of equipment procured by the project. This is due to inadequate organization, the shortage of BMEs and the insufficient development capacity to improve the organization. In the current maintenance status, it is worrying that the procured equipment may become unusable earlier than the expected life for use, if the status is not improved. Major problems have been observed in terms of the organizational aspect and current status regarding maintenance for this project. Therefore, sustainability of the project effects is low.

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

4.2. Recommendations

4.2.1. Recommendations to the Executing Agency

4.2.1.1. Improvement in the Organizational Aspects of Maintenance

In this project, it was recognized as a problem that some medical instruments were not being used at the target hospitals either because repairs or parts were not available. This is caused by the inadequate maintenance organization for maintenance. Ex-post evaluation recommends both

fundamental and emergency measures for the improvement here.

(1) Development and allocation of BME (fundamental measure)

a) Desired responsibilities assignment

Although it takes time to solve this problem fundamentally, it is necessary for each organization to be able to fulfill the following responsibilities in maintenance. The target hospitals were particularly troubled by the problem with the agencies' response, because they could not propose any effective countermeasures. In this situation, the following measures involving the executing agency were presented to the hospitals. The measures received a very high level of appreciation and approval from them. On the other hand, they also agreed that they must assign a maintenance supervisor and establish a close communication system with the executing agency for its realization.

Procurement Division (BME Division in the new organization)

- To identify the economically effective ones on the maintenance and/or regular inspection contracts for the expensive equipment and actively make use of such insurance measures by allocating budget for them

CMSD (the local offices of BME Division in the new organization)

- To collect information on alternative parts and alternative agencies from the hospitals and accept their consultation
- To give effective advice to the hospitals when consulted
- To implement countermeasures to the agencies problems, such as order to improve their response.

Maintenance supervisor in each hospital

- To aggregate and arrange repair among others in the hospital
- To report and consult with the local office in charge
- To judge appropriateness of repair and negotiate with an agent.

b) Necessary actions

In order to carry out the above responsibilities, each organization is recommended to take the following specific actions. In particular, the Procurement Division is required to develop BMEs with the capacity required for maintenance and allocate them to each relevant organization.

Procurement Division (BME Division in the new organization)

- To develop and allocate the required BME human resources for the local offices and the hospitals. However, because it does not have sufficient capacity to develop BME by itself in the current status, it is required to proceed with the following steps.
  - To clarify the requirements and roles of BME in Myanmar. (It is desirable to refer to the experience and the opinion of the maintenance supervisor who made a practical achievement.)
  - To seek cooperation of the donors with the development capacity and develop BME based on the clarified requirements and roles (get cooperation of agents when necessary). During the process, the division should also acquire capacity for development.
  - After that, the Procurement Division should develop BME by itself. In response to requests,

it should also accept the hospital engineers among others to develop their BME capacity.

CMSD (the local offices of BME Division in the new organization)

- To request the Procurement Division to allocate BME with knowledge about maintenance.

Each hospital

- To request the Procurement Division to allocate BME or develop the capacity for electrical engineers in the hospital, so as to appoint the maintenance supervisor.
- Utilize JICA volunteers with knowledge of maintenance who are being dispatched to several hospitals.

(2) Establishment of Regular Maintenance Conference (urgent measure)

In order for the maintenance problems currently occurring at each hospital to be led in the direction of the solutions even a little, improvement in maintenance that can be done immediately with the current staff and organization is required. It is desired to make the emergency measure that meets the objectives and reality. For this purpose, an idea is recommended hereunder. First of all, it is urgent to hold a regular conference on maintenance in order to create a bottom-up network in which information can be exchanged.

First, the hospital regular conference on maintenance should be held in each hospital. In each hospital, considering the current status where each medical unit is individually requesting agencies for repair, each medical unit appoints a unit maintenance supervisor from among those who actually request the agencies to repair. From each unit, the appointed person attends the meeting. It is desirable that the maintenance supervisor candidate should act as the chairperson. Then, information on maintenance (for example, problems with unavailable parts and the agency response, and solutions such as alternative parts and alternative agencies) is aggregated and exchanged in the hospital conference, so that the maintenance supervisor candidate can grasp the maintenance information.

Next, in each city (Yangon and Mandalay), a regional conference on maintenance should be held to exchange information between hospitals. A maintenance supervisor at the local CMSD office should be appointed to act as the chairperson. The maintenance supervisor candidate who grasps the information should participate from each hospital.

Finally, a conference should regularly be held in the regulatory organization involving the maintenance supervisors at the local CMSD offices and Procurement Director in Nay Pyi Taw to share problems and make countermeasures (especially for improvement of agency response).

The Regular Maintenance Conference system will aggregate and share the problems and make the solutions available through a bottom-up information network. The Procurement Division in DoMS should provide leadership to the hospitals and CMSD so that the regular maintenance conference will be held at each level of the hospital, the region, and the supervisor organization.

4.2.1.2. Effective utilization of unused equipment in the laboratory

Two instruments (ref. 3.4.2.1) are not being used after the doctor who worked at the time of the equipment request was transferred. In this regard, it is desirable that DoMS arranges a doctor

who can use them or move them to a hospital that needs them in order to use them effectively.

4.2.2. Recommendations to JICA

4.2.2.1. Cooperation to improve the maintenance organization

JICA already recognizes that it is indispensable to improve the maintenance organization in order to continually and effectively utilize the medical equipment procured through the cooperation projects including this project. Therefore, it has been dispatching JICA volunteers with expertise in this field and has cooperated in establishing and operating the one-year BME training course at UMT starting in May 2018.

(1) Support for BME development (fundamental countermeasure)

With regard to BME in Myanmar, the definition and/or the requirements and roles matching the country are not clarified, as described above. Considering the result of the soft component of this project which could not take effect due to insufficient discussion with the supervisor section, it is necessary that JICA discuss well and build consensus with the responsible official in DoMS, in order to effectively cooperate in the BME training course at UMT. In that case, it is desirable to pay attention to the realization of the recommendations to the executing agency described in 4.2.1.1(1), and to focus not only on engineering skills but also on administrative skills to be acquired.

Especially, formulation of the BME requirements in the country is an important issue. In order to formulate the requirements, it is possible to refer to the work and opinions of the staff member who made a practical achievement in maintenance. For example, one role model could be the staff member who has served as a maintenance supervisor in YWH for many years (transferred to the Procurement Division in March 2018) and made an achievement in implementation of effective maintenance. The opinions of such a staff member are thought to be very helpful in formulating the requirements for BME in the country.

For the training method, a specific example of success can be referred to. For example, the above staff member, being originally an electric engineer, participated in JICA training in Japan, regularly visited senior volunteers dispatched to New Yangon General Hospital, learned a lot and showed an efficient performance in the field of maintenance. Such an example will help to decide what kind of support is needed and how it should be utilized for effective BME development.

Since it is considered that JICA has much knowledge in other countries regarding human resource development for the purpose of improving maintenance, it seems remarkably useful for JICA to share this knowledge in discussion when formulating requirements and training methods for BME in Myanmar.

(2) Support for establishment of Regular Maintenance Conference (urgent measure)

Desirably, JICA should follow up the establishment and implementation of the Regular Maintenance Conference which is an urgent measure recommended above, since the maintenance status of the equipment procured under the project is worrying. It could have JICA volunteers with maintenance knowledge attend the conference and cooperate in planning the measures. The

maintenance supervisor who recognizes their capacity in the conference could be expected to visit the local JICA volunteers to receive their guidance. In addition, it is also expected that the decisions in the regular conference could be reflected in the support for the BME training course.

4.3. Lessons Learned

4.3.1. Improvement in procurement for continual and effective use of specialized equipment

In this project, a few pieces of specialized equipment in the laboratory are no longer used. Regarding the specialized equipment, it is recommended to pay attention to the following points in future.

- In selecting equipment, to make sure that there are more than one medical worker who want to use it with continual demand for it, in order to avoid a situation (ref. 3.4.2.1) where the equipment is no longer used after the transfer of the doctor who requested the procurement.
- To consider the price of the consumable well when selecting the equipment model, in order to avoid a situation where the equipment requiring an expensive consumable is no longer used (ref. 3.4.3.2). It must be checked with the government section authorizing the budget (DoMS in this project) in addition to the installation hospital whether the expensive consumables are affordable continuously or not. If the consumables are too expensive to afford, that model should be excluded from the choices.

4.3.2. Effective design of maintenance training (soft component)

Maintenance training implemented in the soft component of this project was originally extremely important, although it did not have much effect. It seems because it was not fully understood that the fundamental cause of the maintenance problem lies in inadequate organization and shortage of human resources. As a result, the training was designed only in consideration of the superficial problems that repairs were not adequately requested to the agencies. In order to have an effect, it was necessary to establish a system to aggregate and share the maintenance information first, develop the countermeasures with the agencies, and improve the repair environment. Analyzing the problem further, it was necessary to develop human resources called BME in order to establish the system. In this way, there was a rather deep-rooted problem behind the inadequate maintenance of equipment. In order to design an effective soft component, it is desirable to fully investigate the fundamental causes of the problem occurring actually and design the training.

End

Republic of the Union of Myanmar

FY2017 Ex-Post Evaluation of Japanese Grant Aid Project
"Project for Upgrading the Health Facilities in Central Myanmar"

External Evaluator: Hiroki Kajifusa, Kaihatsu Management Consulting, Inc.

0. Summary

This project was implemented for the objective of expanding health services and improving access to them, by developing facilities and equipment of Rural Health Centers (hereinafter referred to as "RHCs") and Sub-rural Health Centers (hereinafter referred to as "SHCs") and by upgrading equipment of Township Hospitals and Station Hospitals[1] in Magway Region, thereby contributing to the improvement of the referral system of the townships.

Implementation of this project is consistent with Myanmar's development policy, which is focusing on expanding provision of primary health care and basic services, and with the development needs of renewing health facilities in peripheral areas that are old and damaged, and expanding health services and improving access to the services in areas with low maternal and child health indicators. The project is also consistent with Japan's ODA policy, which aims to support the development of health services to improve people's livelihood. Therefore, relevance of the project is high.

Both facility construction and equipment procurement were carried out as planned, and all minor changes were necessary and appropriate. Both the project cost and the project period are within the plan, and thus efficiency of the project is high.

It was found that this project contributed to the promotion of institutional delivery in the target area, because the number of institutional deliveries at the RHCs in 9 target townships of the project has increased. Safety and functionality of RHC buildings have been improved, and satisfaction of pregnant women and health staff is high in relation to improved services. An increase in antenatal care coverage, and reduction in the rate of home deliveries, also have been realized in the target townships as a whole, and the project created an impact of improved structure for accepting the patients within the townships. It can be said that the higher-quality maternal and child health services became available at the target facilities of this project in general; however, the number of users of services, such as institutional delivery, has not increased from before to after the project in a part of the target RHCs, and medical treatment such as surgery has not been able to be carried out in a part of the target Station Hospitals due to the absence of doctors. This project has achieved its objectives to some extent. Therefore, effectiveness and impacts of the project are fair.

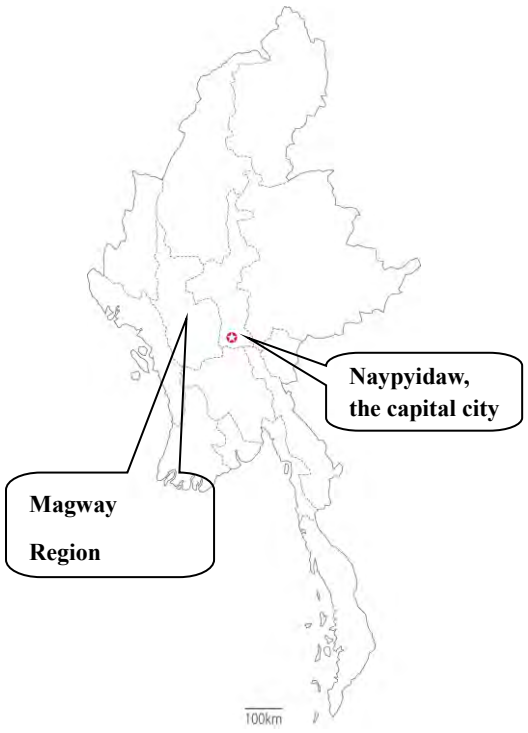
[1] Station Hospitals and Township Hospitals are secondary medical facilities that provide basic curative services, basic medicines, surgery and childbirth delivery services, and accept patients who have been transferred from the lower-levels medical facilities. (Source: Ex-ante evaluation of the project)

There are no cases of defects in or non-use of the equipment upgraded by this project due to the technical and financial problems from the operation and maintenance. However, there are hospitals which are short on doctors or have an inadequate system for replacing parts of the equipment and repairing the facility. Therefore, sustainability of the project is fair.

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

1. Project Description

1.1 Background



Project Location Map

Appearance of a newly-constructed RHC
(Standard type)

Appearance of a newly-constructed RHC
(Raised-floor type)

Source: The photo on top was taken at the time of the ex-post evaluation by the external evaluator in December 2017 and the one at bottom was taken in September 2014 and provided by JICA.

The Myanmar government was working to improve RHCs and SHCs,[2] increase the number of basic health staff engaged in them, strengthen in-service education, enhance the referral system, in order to improve the condition of basic health services in rural areas by improving access to health services through development of health facilities in peripheral area. In Magway Region, the target area of this project, indicators for maternal and child health were among the lowest in the whole country, and the number of RHCs was insufficient.[3] RHCs and SHCs in the

[2] RHCs and SHCs are primary medical facilities that provide primary health care such as treatment for general injuries, antenatal care and childbirth delivery services, infant health examination, vaccination, etc. in rural areas (Source: Ex-ante evaluation of the project).

[3] They had not reached the Myanmar government's standard level of one center per 20,000 people (as of 2009).

area were found to have cracks in foundations, and uneven or collapsed floors, etc. due to their age, and thus to have a problem of safety. There was heavy rain in the Central Dry Zone of the country including Magway Region in October 2011, and some health facilities were damaged by flooding. Emergency measures were taken at the affected facilities, but there was serious damage, and maintenance and restoration were needed urgently. In order to improve this situation, the Government of Myanmar requested the Japan International Cooperation Agency (JICA) for grant aid to develop facilities and equipment of RHCs and SHCs in Magway Region.

In response to this, JICA conducted a preparatory study of this project from January 2012. This study confirmed that equipment in Station Hospitals and Township Hospitals, which are the upper-level medical facilities of RHCs, were also very old and they were unable to provide adequate services; and thus, this project was implemented for SHCs and RHCs as well as Station Hospitals and Township Hospitals.

1.2 Project Outline

The objective of this project is to expand health services and improve access to them, by improving facilities and equipment in RHCs and SHCs, and by upgrading the equipment of Township Hospitals and Station Hospitals in Magway Region, thereby contributing to improvement in the referral system in the townships. Health indicators in Magway Region performed especially low in health indicators among other regions in Myanmar, and health facilities in the region were damaged by the flood in October 2011.

G/A Grant Limit / Actual Grant Amount	1,256 million yen/ 1,125 million yen
Exchange of Notes Date / Grant Agreement Date	July 2012 / October 2012
Executing Agency	Department of Public Health, Ministry of Health and Sports (Department of Health, Ministry of Health, during the project implementation period)
Project Completion	January 2015
Main Contractors	(Construction) Daiho Corporation (Equipment) Green Hospital Supply, Inc.
Main Consultants	Yamashita Sekkei, Inc. / Nippon Koei Co. Ltd. / Binko International Ltd. (Joint Venture)
Basic Design	January 2012 – December 2012
Related Projects	None

2. Outline of the Evaluation Study

2.1 External Evaluator

Hiroki Kajifusa, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August 2017 – November 2018

Duration of the Field Study: November 26 – December 9, 2017; April 29 – May 5, 2018

2.3 Constraints during the Evaluation Study

In order to analyze the effectiveness of this project, the external evaluator attempted to collect data on the number of institutional deliveries, people who received health check-ups, and surgeries from 73 target facilities, but some of them did not have the necessary data. There were some facilities, which provided data, but their reliability was low. Therefore, in this ex-post evaluation, the external evaluator analyzed only those target facilities with reliable data. Since only a part of the facilities did not have the data, the result of the analysis shows the general trend of the target facilities; however, it does not exactly show the overall trend. The external evaluator indicated the number of facilities included in the analysis for each result.

3. Results of the Evaluation (Overall Rating: B[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Consistency with the Development Plan of Myanmar

Myanmar Health Vision 2030 (2000-2030), the higher-level plan for the health sector in Myanmar at the time of planning and ex-post evaluation of this project, aims to deliver health care services to all so that the population can improve the condition of their health. The *National Health Plan 2006-2011*, the country's development plan in the health sector, aimed to expand coverage and enhance quality of health care, and promote improved health in rural areas. At the time of the ex-post evaluation, the *National Health Plan 2017-2021* focuses mainly on primary health care and provision of basic services below the level of townships. It also continues to aim at improving maternal, child and newborn's health and expanding health services in rural areas in order to achieve universal health coverage by 2030.[6] In addition to this, the *Five-Year Plan on Reproductive Health* (December 2008) mentions that it is necessary to increase birth attendance by skilled health staff, ante- and postnatal care, and institutional

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

[5] ③: High, ②: Fair, ①: Low

[6] Universal health coverage is a state in which everyone can receive services related to appropriate health promotion, prevention, treatment, and rehabilitation at affordable cost. Two points must be met: "Health and medical services are provided close to the population", and "Cost is not a barrier to receiving health care services". (Source: https://www.jica.go.jp/aboutoda/sdgs/UHC.html (in Japanese, accessed on May 31, 2018))

delivery, in order to reduce maternal and infant mortality rates and to achieve Millennium Development Goal (MDG) 5 (i.e., maternal health improvement). In the *Five-Year Strategic Plan for Reproductive Health (2014-2018)* and *National Strategic Plan for Newborn and Child Health Development (2015-2018)* formulated at the time of the ex-post evaluation, improvement and expansion of health infrastructure and improvement in quality of, and access to, services are listed as priority plans to provide services such as the ante- and postnatal care, birth attendance by skilled health staff and neonatal care that are essential for improving maternal and child health indicators.

This project has aimed to expand and improve access to health services in Magway Region, which has low health indicators, through the development of health facilities which are responsible for primary health care and basic services. From the project planning stage through ex-post evaluation, the project is highly consistent with the health sector policy of Myanmar.

3.1.2 Consistency with the Development Needs of Myanmar

At the time of planning, the main problems of maternal and child health of Magway Region were considered to be the high rates of infant and children-under-5 mortality as well as the high rate of home deliveries, when compared to the national average.[7] For this reason, it was necessary to improve facilities and equipment at RHCs and SHCs, the health facilities closest to the population, and thus to promote the practice of institutional delivery attended by health staff. However, as mentioned in "1.1 Background" of the project, RHC facilities in the region were in a very poor condition due to their age, and not in a state that could provide adequate services to pregnant women, including institutional delivery, and thus the need for improvement was high. Even after completion of the project, the home delivery rate in Magway Region is higher than that the national average,[8] and thus the need to promote the institutional delivery attended by health staff through RHC development is still high.

If surgery such as caesarean section is necessary, it has to be conducted at a secondary medical facility where a doctor is located because doctors are not assigned in RHCs. However, at the time of planning, Township Hospitals and Station Hospitals, which are secondary medical facilities, could not provide proper medical services due to the age of equipment or absence of a doctor, and thus the need for improvement was high.

Therefore, this project aimed to expand and improve access to health services by improving health facilities at peripheral area such as RHCs and improving equipment at Township Hospitals and Station Hospitals, is consistent with development needs of Myanmar at the time

[7] The infant mortality rate was 20.8 (per 1,000 living births), mortality rate under 5 years old was 27.2 (per 1,000 living births), and home delivery rate was 78.5% in Magway Region (Source: Preparatory Study Report).
[8] The home delivery rate was 41.1% nationwide and 45.5% in Magway Region (2016); and the institutional delivery rate was 29.6% nationwide and 25.5% in Magway Region (2016) (Source: *Public Health Statistics Report 2014-2016*, Department of Public Health, 2017).

of planning and ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

In *Economic Cooperation Policy for Myanmar*, revised by the Ministry of Foreign Affairs in April 2012, "Supports for the improvement of the life of citizens" were listed as the foremost priority area, and development of health and medical services was one of the concrete programs for cooperation. From this, the purpose of this project was consistent with Japan's ODA policy at the time of planning.

3.1.4 Appropriateness of the Project Plan and Approach

Two methods were taken for development of RHCs in this project. The first was to rebuild a facility and provide equipment (hereinafter referred to as "newly-constructed RHC"), and the second was to provide equipment without rebuilding the facility (hereinafter referred to as "existing RHC").

As confirmed at the time of the ex-post evaluation, there are at least 7 sites among existing RHCs where no delivery-related equipment procured in this project is used because there is no delivery room and a high risk of collapse of old facilities. There have been no cases of childbirth delivery in these facilities. Although there was no clear description in the documents at the time of planning, since the development of health infrastructure was the national policy at that time, it is considered that equipment for delivery was procured with the expectation that these existing RHCs would set up a delivery room or be rebuilt by the Government of Myanmar after implementation of this project. However, as mentioned above, there are some cases where the delivery room has not been set up nor facilities are rebuilt even at the time of the ex-post evaluation. The procurement of equipment related to childbirth delivery in this project without guarantee of setting up a delivery room and rebuilding the existing RHC by the Myanmar government has left a problem in terms of the effect of the project.

As mentioned above, there were some problems in the plan concerning the improvement of existing RHCs, but there were no problems with the rebuilding of RHCs and improvement of equipment in hospitals, which were the main components of the project. Therefore, it can be said that the plan and approach of the project on the whole were appropriate in general.

In summary, this project has been highly relevant to the Myanmar's development plan and development needs, as well as Japan's ODA policy; and project plan and approach was appropriate in general. Therefore, its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

32 RHC facilities were constructed, and equipment was procured for a total of 73 sites, including newly-constructed RHCs, existing RHCs, Township Hospitals and Station Hospitals in 9 townships in Magway Region.[9] Since the regional government had already constructed the facility at one site of the RHCs where construction was planned at the time of planning, the construction was canceled, and thus only equipment was procured by this project. There was no major change in the plan apart from this.

RHC at the time of planning (Lat Seil RHC)

Newly-constructed Lat Seil RHC (at Ex-post Evaluation)

Health staff caring for a pregnant woman at the RHC (at Ex-post Evaluation)

Operating room at a Station Hospital (at Ex-post Evaluation)

Infant warmer and phototherapy unit in use (at Ex-post Evaluation)

Delivery room of a newly-constructed RHC (at Ex-post Evaluation)

Source: Photograph at the time of planning is taken from a document provided by JICA (taken in June 2012). The photographs at the time of the ex-post evaluation were taken by the external evaluator in December 2017.

In procurement of equipment, details of the content and amount of equipment to be distributed were determined for the purpose of improving the function of the facilities, and it was appropriately distributed. For example, more types and numbers of furniture and equipment for diagnosis and newborns were distributed to the newly-constructed RHCs than existing RHCs.

Any minor changes mentioned above in the plan were appropriate as required, and the main achievements of construction of facilities and equipment procurement were as planned as described below. After installing the equipment, initial operation instruction and guidance were carried out by the procurement company.

[9] The 9 townships were: Pakokku, Seik Phyu, Pauk, Myaing, Salin, Saw, Say Toke Ta Yar, Ya Sa Gyo, and Natmauk.

＜Facility Construction＞

Plan (Total 33 single-storey reinforced concrete buildings)	Actual (Total 32 single-storey reinforced concrete buildings)
29 buildings of standard type (198 m^2 of floor space) Storage room, examination room, labor room, delivery room, recovery room, midwife room, waiting room, rooms for staff (Health Assistant, Public Health Supervisor, Lady Health Visitor)	27 buildings of standard type (198 m^2 of floor space) Storage room, general examination room, labor room, delivery room, recovery room, midwife room, waiting room, rooms for staff (Health Assistant, Public Health Supervisor, Lady Health Visitor), washroom, generator room, public toilet, corridor, terrace
4 buildings of raised-floor type (188 m^2 of floor space) The rooms are the same as the standard type.	5 buildings of raised-floor type (188 m^2 of floor space)[10] The rooms are the same as the standard type.
Building Supplementary Facilities: (1) Electrical equipment (in-house generator equipment, lighting and outlet equipment, lightning protection equipment, etc.), (2) Water supply-discharge and sanitation equipment (sanitation equipment, water supply equipment, drainage equipment, etc.)	Building Supplementary Facilities: (1) Electrical equipment (in-house generator equipment, lighting and outlet equipment, lightning protection equipment, etc.), (2) Water supply-drainage and sanitation equipment (water storage tank, elevated water tank, sewage tank, infiltration tank)

Source: Confirmed by documents provided by JICA and on-site study at the time of ex-post evaluation

＜Procurement of Equipment＞

Plan	Actual
RHCs (49 sites) ・ Examination room (medical staff desk and chair, patient stool, examination table, examination lamp, sphygmomanometer, stethoscope, diagnostic set, cabinets, boiling sterilizer, etc.) ・ Midwife room (medical staff desk and chair, sphygmomanometer, stethoscope, foetus stethoscope, obstetric examination set, midwife kit, etc.) ・ Labor room (labor bed, working table, etc.) ・ Delivery room (delivery table, I.V. stand, examination lamp, delivery instrument set, infant treatment table, etc.) ・ Recovery room (recovery bed, baby cot) ・ Rooms for staff (staff desks and chairs, kits for each staff member, etc.)	Common at newly-constructed and existing RHCs (49 sites) Examination table, sphygmomanometer, stethoscope, instrument cabinet, medicine cabinet, boiling sterilizer, fetus stethoscope, midwife kit, ward screen, delivery table, I.V. stand, normal delivery instrument set, infant weighing scale, labor and recovery bed, kits for each staff Newly-constructed RHCs (32 sites) Medical staff desks and chairs, patient stool, examination lamp, diagnostic set, treatment instrument set, treatment trolley, height scale, weighing scale, locker cabinet, obstetric examination set, working tables, cloth basket, infant treatment table, baby cot, diagnostic desk and chair Existing RHCs (17 sites) Examination lamp with solar battery
SHCs (281 sites) Equipment for outreach activities (midwife kit)	SHCs (281 sites) Midwife kit was distributed to SHC through each Township Hospital.

[10] At one location, landowner of the planned site did not agreed for the construction, and therefore, an alternative site was selected. Construction method of building for that site was changed from the standard type to the raised-floor type because the alternative site was lowland.

Township Hospitals (9 sites) ・ Operating room equipment (operating lamp (mobile), operating table, caesarean surgery instrument set) ・ Delivery room equipment (infant incubator (warmer), phototherapy unit, suction unit, vacuum extractors (electric / manual), low pressure continuous suction unit, high-pressure autoclave (electrical type), oxygen concentrator, delivery table, labor and recovery bed, instrument set for normal delivery, etc.)	Township Hospitals (8 sites and one General Hospital[11]) ・ Operating room equipment (operating lamp (mobile), operating table, caesarean surgery instrument set) ・ Delivery room equipment (infant incubator (warmer), phototherapy unit, suction unit, vacuum extractors (electric / manual), low pressure continuous suction unit, high-pressure steam autoclave, oxygen concentrator, delivery table, labor and recovery bed, instrument set for normal delivery)
Station Hospitals (15 sites) Similar to the Township Hospitals, but the vacuum extractor is manual type and the high-pressure autoclave is a stove heating type which does not use electricity.	Station Hospitals (15 sites) Almost same items as Township hospitals, but low-pressure continuous suction unit was not procured, and manual vacuum extractors and high-pressure autoclaves of stove-heating-type, which do not use electricity, were procured.

Source: Confirmed by documents provided by JICA and on-site study at the time of ex-post evaluation

＜Initial Operation Instruction and Guidance＞

- Operation method: Equipment specification outline, operation procedure, and checking of function
- Maintenance method: Daily inspection, cleaning and adjustment, and repair of minor problems
- Delivery documents (Operation manuals and contact list for agents and manufacturers)

3.2.2 Project Inputs

3.2.2.1 Project Cost

The project cost was planned as 1,256 million yen ＜Japan side 1,256 million yen; Myanmar side about 6.2 million kyats (about 620,000 yen)[12]＞. The actual cost was within the plan at 1,125 million yen on the Japanese side (90% of the plan).

3.2.2.2 Project Period

The project period was planned for 30 months from May 2012 to October 2014. The actual project period was 27 months from October 25, 2012 to January 6, 2015 and was within the plan

[11] Pakokku is located at center of the District, the administrative division above the Township, and its General Hospital serves as a Township Hospital, too.

[12] Based on exchange rate at the time of ex-ante evaluation (1 kyat = 0.1 yen) (Source: Preparatory Study Report). According to the explanation of each Township Public Health Office, the breakdown of the project cost of Myanmar side, which was related to construction work, was securing of project sites and land preparation (demolition of existing buildings and tree cutting). They also mentioned that the construction sites of RHCs were located within the premises of existing buildings or donated, and the people around the construction sites conducted demolition of the existing buildings and tree cutting without the payment.

(90% of the plan).

As a result, both the project cost and the project period of this project were within the plan, and therefore the efficiency of the project is high. However, the external evaluator could not confirm the project cost of Myanmar side.

3.3 Effectiveness and Impacts[13] (Rating: ②)

3.3.1 Effectiveness

3.3.1.1 Quantitative Effects (Operation Indicators)

＜Quantitative Indicators at Planning＞

At the time of planning, the followings were listed as quantitative indicators of this project.[14]

(1) Increase in number of service beneficiaries (persons): Baseline value 0 (2012) → Target value 80,000 (2018)

(2) Number of beneficiaries of facility delivery service (persons): Baseline value 5,800 (2012) → Target value 17,000 (2018)

(3) Number of institutional deliveries at RHCs which have delivery facilities in the townships (cases): Baseline value 34 (2012) → Target value 99 (2018)

However, (1), the number of service beneficiaries, is the population of the jurisdictional area of newly-constructed RHCs which were upgraded from SHCs.[15] It increases regardless of the plan of this project when RHCs are added due to upgrade, and thus it is inadequate as a target value to measure a quantitative effect of this project.[16] (2), the number of beneficiaries of facility delivery service is the estimated number of births in the jurisdictional area of the RHCs which have delivery facilities. However, no township is able to provide information on the number of births in rural areas and the number of RHCs equipped with delivery facilities in time series, which are the basis of calculation; and thus, it is difficult to measure the actual value of a quantitative effect. The actual value of (3), the number of deliveries at RHCs which have delivery facilities in the townships, is available, and is analyzed as follows.

As shown in Table 1, in the document of planning this project, the baseline value (2012) of the number of institutional deliveries in the target area was 34 and the target value (2018) was 99. However, at the time of the ex-post evaluation, when examining the results after 2012, it was 248 in 2012; the baseline value described in the planning document was based on limited information at that time, and very much different from the real value. Therefore, the target value

[13] Sub-rating for Effectiveness is to be put with consideration of Impacts.
[14] Source: Preparatory Study Report
[15] Three to five SHCs are established around one RHC to complement the provision of health services. Five of the RHCs subject to development of this project were upgraded from SHCs and newly constructed.
[16] As reference, the actual value of covered population of the upgraded 5 RHCs in total is 77,517 (2017), which is lower than the target value of 4 sites at the time of planning. The number of RHCs between the target value and the actual value is different; and they are difficult to compare, and currently, there are many sites which have lower number of population than the installation standard of an RHC that is 20,000 people.

set at planning is also inappropriate for measuring the level of achievement.

Table 1　Quantitative Indicator: Baseline, target and actual values

Quantitative Indicator	Baseline	Target	Actual			
	2012	2018	2012	2015	2016	2017
		3 years after completion	At planning	Year of project completion	1 year after completion	2 years after completion
Number of institutional deliveries (cases)	34	99	248	643	857	1,452

Source: Sources of the baseline and target values were Preparatory Study Report and ex-ante evaluation of the project. Source of actual value was the data provided by the 7 townships.

The actual number of institutional deliveries in the target area confirmed at the time of the ex-post evaluation has increased by more than 5 times, from 248 cases at the time of planning (2012) to 1,452 cases at the time of the ex-post evaluation (2017). As described later, the number of delivery facility users has increased in 52% of the RHCs developed by the project, and thus the development of delivery facilities in the project has contributed to the increase in the number of institutional deliveries in the target area. However, as mentioned above, since the target value was inappropriate, it cannot be determined whether the target was achieved.

Although this project targeted 9 townships, at the time of the ex-post evaluation, only 7 townships submitted all actual values from 2012 to 2017.[17] The results in Table 1 are the total number of institutional deliveries at these 7 townships.

＜Additional/Alternative Quantitative Indicators＞

The indicators (1) and (2) shown at the time of planning, as mentioned above, are the covered population of the newly-established RHCs developed by this project. While these indicators show a kind of improvement of access to health services, they do not show the operation status of all the facilities and equipment targeted in this project for producing expected effects. Therefore, the comparative analysis between planning (2012) and ex-post evaluation (2017) was done as follows for RHCs (newly-constructed and existing) and Township Hospitals and Station Hospitals developed by the project by using alternative operation indicators, which show the usage status of facilities and equipment, by which the service improvement was expected according to the contents and functions of these inputs.

[17] 7 townships are Pakokku, Seik Phyu, Pauk, Salin, Saw, Say Toke Ta Yar, and Ya Sa Gyo. Myaing and Natmauk have no data of 2012 as baseline.

- Qualitative Indicators for Target RHCs

Number of delivery facility users[18]

The number of delivery facility users of the target RHCs has increased at 21 sites (52%) out of the 40 valid answers (Table 2). There are many newly-constructed RHCs (19 sites) with increased delivery facility users; 11 of these had no delivery facilities users at the time of planning, and these have been utilized only after this project (increased from 0 persons). In other words, after completion of this project, childbirth delivery has started to be administrated at these RHCs. The total number of users of delivery facilities has almost doubled from 1,237 to 2,205 (Figure 1). It should be acknowledged that active use of newly-prepared delivery facilities has been promoted.

On the other hand, there are 16 RHCs with no users of delivery facilities before and after the project. 11 of these are existing RHCs to which the project provided only equipment. It is explained that childbirth at RHCs has not been administrated because delivery rooms have still not been set up as of the time of the ex-post evaluation and/or the buildings are too old.[19] According to interviews with the Township Public Health Department at the time of ex-post evaluation, there are areas where the preference for home delivery is strong and institutional delivery at RHCs is not promoted well (See Footnote 28). Furthermore, since NGOs provide a subsidy for transportation costs for childbirth at hospitals, there are cases where childbirth is preferred at hospitals rather than at RHCs. This provides background as to why delivery facility users did not necessarily increase at RHCs.

Table 2 Changes in the number of users of delivery facilities

	Sites with No Users	Sites in Decrease	Sites in Increase	
			From 0	From ≧ 1
New (n=27)	5	3	11	8
Exist (n=13)	11	0	0	2
Total RHC (n=40)	16	3	11	10
(%)	40%	8%	28%	25%

Note: "No user" indicates that there were no users before and after the project. The project had 32 newly-constructed and 17 existing RHCs in total (Numbers of RHCs of the two categories is same for other tables).

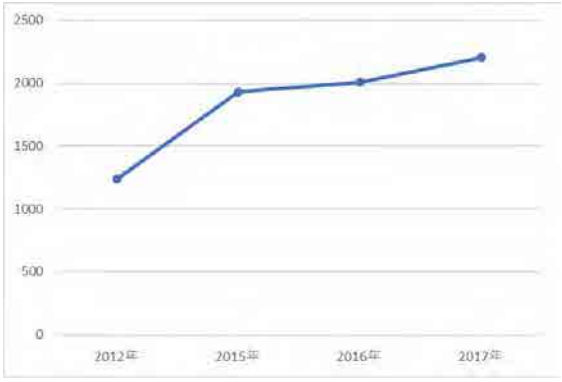


Figure 1 Total number of users of delivery facilities (n=40)

Note: The project had 49 RHCs in total (Number of RHCs in total is same for other tables).

Source: Elaborated by the external evaluator based on the data provided by each township

[18] In this report, facilities to carry out facility delivery such as labor room, recovery room and midwife room, attached to the delivery room, are collectively referred to as "delivery facilities" (a delivery room is a part of delivery facilities). On the other hand, distinctively, a delivery room without other attached rooms or a space secured as a delivery room is called a "delivery room".

[19] Based on interviews at 2 existing RHCs by field visits (both have no delivery room and do not use the delivery table) and answers from each township about the use of the delivery table at each RHC.

Number of persons who received antenatal care

The number of persons who received antenatal care at target RHCs has been increased at 24 sites (about 60%) out of the 41 valid answers (Table 3). It has increased in 10 sites at existing RHCs. 4 of the newly-constructed RHCs have increased from no antenatal care, and it seems that the new facilities have promoted people receiving antenatal care. Meanwhile, at some sites, the numbers have decreased from before to after the project and others has been no antenatal care both before and after the project. Some of the reasons for this trend are the strong preference of home delivery and the cases where childbirth at hospital is preferred rather than at RHC, as mentioned in the section of "Number of delivery facility users". Another reason is that there have been more outreach activities conducted by Lady Health Visitors and Midwives. The total number of people received antenatal care has increased from 5,700 to 8,223 people, which shows that antenatal care has been promoted (Figure 2).

Table 3 Changes in the number of people who received antenatal care

	Sites with No Antenatal Care	Sites in Decrease	Sites in Increase	
			From 0	From ≧ 1
New (n=27)	0	13	4	10
Exist (n=14)	2	2	0	10
Total RHC (n=41)	2	15	4	20
(%)	5%	37%	10%	49%

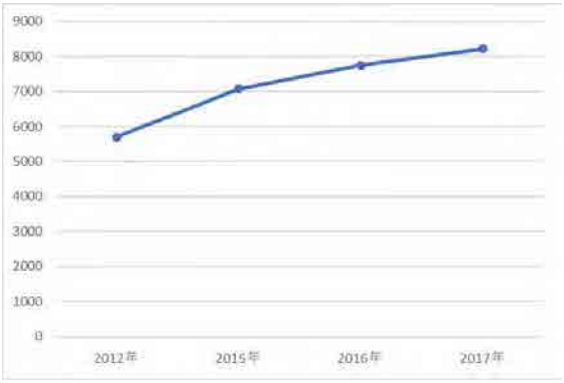


Figure 2 Total number of people who received antenatal care (n=41)

Source: Elaborated by the external evaluator based on the data provided by each township

Number of people who received postnatal care

The number of persons who received postnatal care at target RHCs has been increased at 25 sites (approximately 60%) out of the 41 valid responses (Table 4). There are 8 newly-constructed RHCs that has increased from no postnatal care, and the number has increased in half of existing RHCs. The total number of people has increased from 4,917 to 5,739, indicating that postnatal care has been promoted to a certain extent (Figure 3). The reason fewer people received postnatal care compared to antenatal care is that it is hard for a mother to move so soon after giving birth owing to the distance from home to RHC or difficulty obtaining transportation.

Table 4　Changes in the number of people who received postnatal care

	Sites with No Postnatal Care	Sites in Decrease	Sites in Increase	
			From 0	From ≧1
New (n=27)	1	8	8	10
Exist (n=14)	4	3	0	7
Total RHC (n=41)	5	11	8	17
(%)	12%	27%	20%	41%

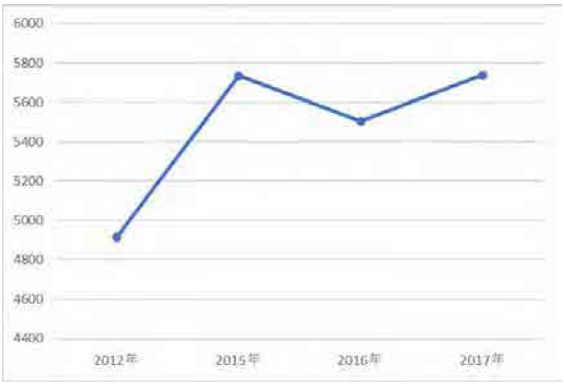


Figure 3　Total number of people who received postnatal care (n=41)

Source: Elaborated by the external evaluator based on the data provided by each township

Number of infant and child care examinees

The number of infant and child care examinees at target RHCs has been increased at 28 sites (about 70%) out of the 40 valid answers (Table 5). There are 7 newly-constructed RHCs that has increased from no examinees, and more than half of the existing RHCs also increased the number of examinees. The total number of examinees has increased from 1,701 to 2,610 (Figure 4). This is due to the fact that with the increase in institutional delivery, examination of newborns, which is not done at home delivery, is carried out immediately after childbirth.

Table 5　Changes in the number of infant and child care examinees

	Sites with No Examinees	Sites in Decrease	Sites in Increase	
			From 0	From ≧1
New (n=27)	1	6	7	13
Exist (n=13)	4	1	0	8
Total RHC (n=40)	5	7	7	21
(%)	13%	18%	18%	53%

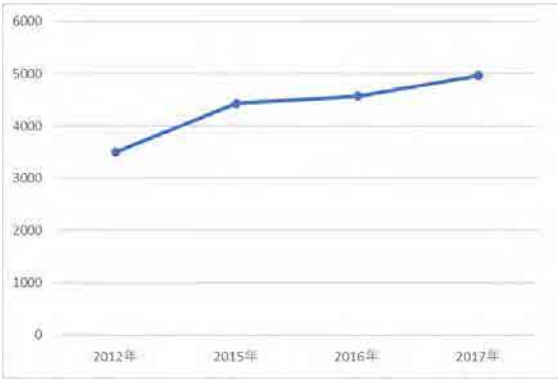


Figure 4　Total number of infant and child care examinees (n=40)

Source: Elaborated by the external evaluator based on the data provided by each township

Number of general outpatients

The number of general outpatients at the target RHCs has been increased at 23 sites (about 60%) out of the 40 valid answers (Table 6). There are 3 newly-constructed RHCs that has increased from no outpatients, 5 newly-constructed RHCs more than has doubled the number of outpatients, and the number has increased in 5 existing RHCs. On the other hand, the number of outpatients has decreased at 17 sites, and the total number of people overall has decreased slightly after completion of the project (Figure 5). The Township Public Health Department is

strengthening training for basic health staff, and the number of days when RHCs cannot be opened has increased in the absence of health staff due to training being held.

Table 6　Changes in the number of general outpatients

	Sites in Decrease	Sites in Increase	
		From 0	From ≧1
New (n=26)	8	3	15
Exist (n=14)	9	0	5
Total RHC (n=40)	17	3	20
(%)	43%	8%	50%

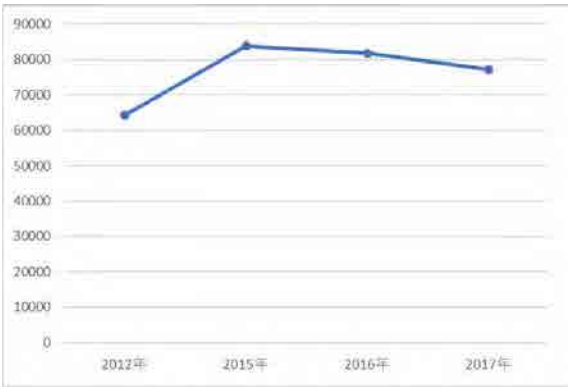


Figure 5　Total number of general outpatients (n=40)

Source: Elaborated by the external evaluator based on the data provided by each township

As mentioned above, as a result of analyzing the facilities that had valid responses out of the 49 RHCs (newly-constructed and existing), it was found that the number of people who received antenatal, postnatal, infant and child cares and general outpatients has increased between 60% and 70% in facilities, and the number of delivery facility users has increased in 52% of facilities. From this it can be said that the use of services of primary health care has been promoted to a certain extent by the operation of facilities and equipment developed in this project as a whole. In particular, in 70% of newly-constructed RHCs the number of delivery facility users has increased and some of them started childbirth delivery for the first time after completion of this project. That shows that this project has promoted institutional delivery at RHCs. However, most existing RHCs have still not carried out childbirth delivery at the facility at the time of ex-post evaluation, and thus promotion of institutional delivery by this project has not been realized at them.

- Quantitative Indicators of Township Hospitals and Station Hospitals

Number of surgeries per month

Among 22 sites with valid answers, out of the 24 hospitals, 15 sites (68%) have increased the number of surgeries per month. 10 hospitals, the largest group, are carrying out up to twice the number of surgeries per month. There are 3 hospitals carrying out more than 4 times the number of surgeries per month, because of an increase in the number of doctors who perform surgery. However, at 4 target hospitals (all are Station Hospitals), no doctors have been deployed since this project was planned and completed, and thus surgery has not been carried out. The total number of surgeries has increased from 4,021 to 7,816, nearly doubling. The decrease in the number of surgical surgeries in 2017 has been affected by a decrease in the number of surgeons

at some hospitals.

Table 7 Changes in the number of surgeries per month

	No Surgeries	Decreased	Increased by <2 times	Increased by 2-4 times	Increased by ≧4 times
Township Hospitals (n=9)	0	1	4	2	2
Station Hospitals (n=13)	4	2	6	0	1
Total (n=22)	4	3	10	2	3
(%)	18%	14%	45%	9%	14%

Note: "No surgery" indicates that there are no surgeries before and after the project. The total number of project target hospitals is 9 Township Hospitals and 15 Station Hospitals (It is same in other tables).

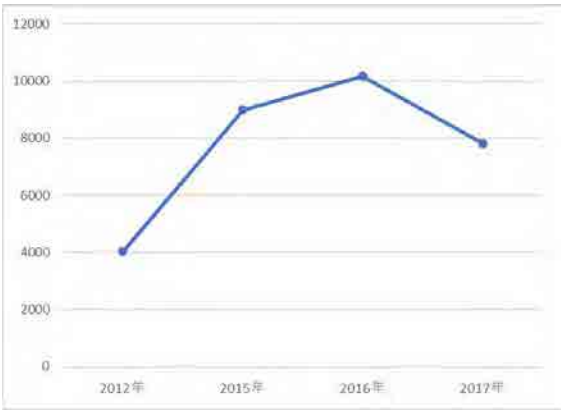


Figure 6 Total number of surgeries per month (n=22)

Note: The total number of project target hospitals is 24 sites (It is same in other figures).

Source: Elaborated by the external evaluator based on the data provided by each township

Number of deliveries per month

The number of deliveries per month at the target hospitals has increased at 17 sites (74%) out of the 23 valid answers. Many Township Hospitals have increased the number of deliveries per month by up to 5 times, while at Station Hospitals there are many sites that have increased by more than 5 times, indicating that institutional delivery is increasing in hospitals close to rural areas. However, there are no medical staff who can provide birth attendance at 3 Station Hospitals, and there have been no deliveries from the time of planning through ex-post evaluation. The total number of deliveries has increased nearly threefold from 2,770 to 7,841, and it can be said that childbirth delivery has increased remarkably overall.

Table 8 Change in the number of deliveries per month

	No Deliveries	Decreased	Increased by <2 times	Increased by 2-5 times	Increased by ≧5 times
Township Hospitals (n=9)	0	1	3	3	2
Station Hospitals (n=14)	3	2	1	2	6
Total (n=23)	3	3	4	5	8
(%)	13%	13%	17%	22%	35%

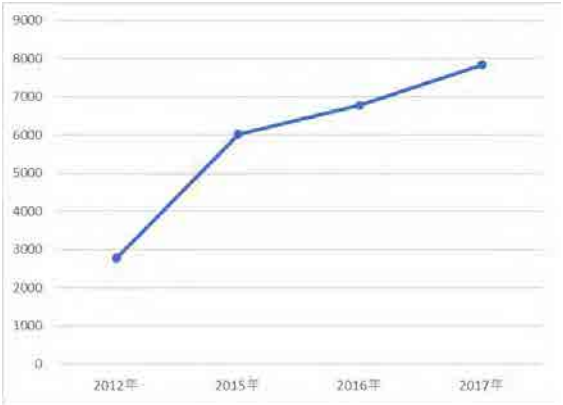


Figure 7 Total number of deliveries per month (n=23)

Source: Elaborated by the external evaluator based on the data provided by each township

Number of caesarean sections per year[20]

The number of caesarean sections per year at the target hospitals has increased at 15 sites (66%) of the 23 valid answers. The background of the increase is the placement of doctors who can perform surgery. However, as with the number of surgeries per month, doctors are not located at 4 Station Hospitals, and caesarean section surgery has not been carried out from planning to ex-post evaluation. The total number of surgeries has doubled from 2,998 to 5,978 cases, and it can be said that the number of surgeries has increased significantly on the whole.

Table 9 Changes in the number of caesarian sections per year

	No Surgeries	Decreased	Increased by <2 times	Increased by 2-5 times	Increased by ≧5 times
Township Hospitals (n=9)	0	1	5	2	1
Station Hospitals (n=14)	4	3	3	3	1
Total (n=23)	4	4	8	5	2
(%)	17%	17%	35%	22%	9%

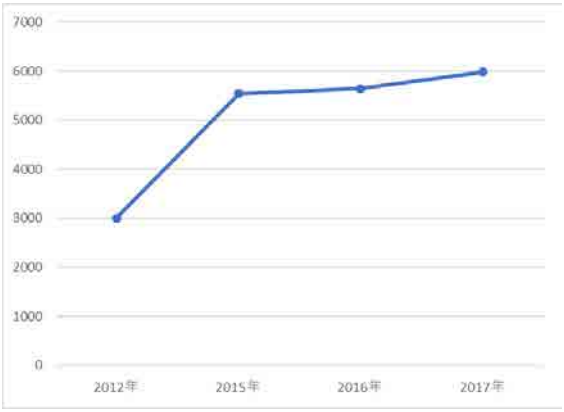


Figure 8 Total number of caesarian sections per year (n=23)

Source: Elaborated by the external evaluator based on the data provided by each township

Based on the above, about 70% of the hospitals with a valid response, out of the 24 hospitals developed by this project, has increased all the numbers, including surgeries per month, deliveries per month and caesarean sections per year, and as a whole it can be said that at the target hospitals the use of medical services has been promoted by the operation of the improved equipment. In addition to the fact that this project enabled accepting and treating more patients at hospitals, the fact that vacancies of doctors were filled after project completion also led to the increase. In these hospitals, the equipment procured was used to help restart medical services such as examination and surgery. Meanwhile, at the Station Hospitals (4 sites) where doctors have not been placed even at the time of ex-post evaluation, promotion of service utilization through operation of the equipment procured by this project has not been realized.

3.3.1.2 Qualitative Effects (Effect Indicators and Other Effects)

＜Quality Improvement of Services＞

At the time of planning, it was mentioned that the quality of services provided at the health

[20] Although it can not necessarily be said that the quality of care was improved only by increasing the number of caesarean sections, a system that foresees deliveries with high risk that cannot be done at RHCs and accepts them at a hospital, is enhanced as mentioned in “3.2.2 Impact”, it is said that the necessary caesarean sections are carried out by doctor's judgement.

facilities supported by this project would improve as a qualitative effect of this project.[21] First, improvement of the quality of services in the newly-constructed RHCs is as follows. Based on the results of RHC visits in the field study of this ex-post evaluation and the qualitative study for beneficiaries, it was found that the following service improvement has been realized in the newly-constructed RHCs.[22]

- It is easier to keep facilities clean

  The earlier RHCs were wooden buildings with brick or wooden floors, but the newly-constructed RHCs were made of reinforced concrete with tiled floors, making it easier to keep the facilities clean and disinfected.
- The risk of infection has reduced

  Since the labor room, delivery room and recovery room are separated in the newly-constructed RHCs, the hygienic condition of pregnant women and newborns has improved, and the risk of infection has reduced compared with home deliveries, where they are kept in the same room both before and after delivery.
- Safety and reliability of childbirth have increased

  RHCs are safer than home birth because there is a team of several health staff at RHCs with the necessary medicine, while only a midwife attends with limited medicine at the time of home delivery. Also, a midwife is often called just before the delivery at home, whilst pregnant women can stay well in advance of the delivery at RHCs, and rest for a while in the recovery room after childbirth, and thus it is safer for pregnant women.
- Privacy has increased

  The newly-constructed RHCs are wider than before. In addition, they are designed to have separate delivery section, the general consultation section, and staff room dedicated to each staff member,[23] so that the room can be used for each purpose. Because it is possible to separate pregnant women and general outpatients, privacy is secured at the time of counseling, such as when discussing results of HIV testing before childbirth, and about contraception, etc.
- It has become easier to control supplies, such as medicine and medical examination tools, as well as user records.

  Facilities were made wider to place furniture such as medicine cabinets in separate rooms, and thus it became easier to organize supplies such as medicine and examination tools, as

[21] Source: Ex-ante evaluation of the project

[22] In this ex-post evaluation, 4 RHCs (two newly-constructed sites and two existing sites) were visited; in the qualitative study, group interviews were conducted to the beneficiaries (RHC staff members / community leaders, and women who experienced birth delivery) at a total of 9 newly-constructed RHCs at each of the townships. . The group interview sites were narrowed down based on RHCs which were constructed as raised-floor type for disaster prevention, RHCs upgraded from SHCs, completed RHCs with 4 health staff professionals, and finally decided after receiving advice from each township. There was a total of 190 people (55 RHC staff members, 46 community leaders, 89 women who had given birth) who participated in the interviews.

[23] 4 professions of Health Assistant, Lady Health Visitor, Public Health Supervisor 2 and Midwife.

well as user records, and to store them hygienically.[24] The number of elderly people, pregnant women, and children who use RHCs, including for health checks such as blood pressure measurement, has increased because of increased storage of drugs and nutritional supplements for general injuries and illness that can be used for outpatient visitors free of charge.

Next, improvement in the quality of services of the target hospitals is as follows. It is recognized that there are cases in these hospitals where better services are possible in surgery and childbirth delivery, utilizing updated equipment. For example, before the project, target hospitals were short on recovery beds for patients who needed rest, warmers for low birth-weight newborns and cold weather, phototherapic units for neonatal jaundice, and thus they used to modify equipment and furniture in hand to compensate for that. However, they lacked functionality. With this project, it became possible to provide appropriate services, using equipment that should have been used originally.

＜Other Qualitative Effects＞

As other effects, it was expected at the time of planning to increase motivation to work of basic health staff working at RHCs, SHCs, Township Hospitals and Station Hospitals, to improve satisfaction of patients with health services at the facility, and to raise willingness for institutional delivery at RHCs.[25] At the time of ex-post evaluation, these effects are confirmed by field visits and qualitative study as follows.[26]

- Increased basic health staff's motivation to work

  As mentioned above, because the facilities of RHCs are larger and cleaner, and the number of equipment and drugs to be used increased, it became possible to provide better health services. This led to basic health staff having confidence to explain the improvement and benefits of medical examination and childbirth at RHCs to the community, and to encourage them strongly to have such services. At the Station Hospitals, in addition to updating the necessary equipment, it is found that as vacancies for doctors were filled, more surgeries were carried out, and more patients were accepted, nurses felt more job satisfaction.

- Increase of patients' satisfaction with health services

  People in the community evaluate positively and are interested in the improved facilities of new and wider RHCs. In recent years, the number of staff in RHCs has increased, and younger and female staff are caring their patients with kindness. This gives a favorable impression to the community. By improving services through the use of new equipment,

[24] It was also reported that they were damaged due to mice and insects before rebuilding.
[25] Source: Ex-ante evaluation of the project
[26] Opinions of beneficiaries (RHC staff and women who experienced childbirth) through field study and group interviews in qualitative study.

patients' trust in RHC staff also increased. It is highly satisfactory that high quality services can be received free of charge, without going to the hospitals outside the village which incurred transport expenses.

- Increased willingness for institutional delivery at RHCs[27]

  The community seems to be more willing to practice institutional delivery, due to collective health education regularly carried out at RHCs, extension of antenatal care, and word of mouth from experienced births at RHCs. Whereas household chores and childcare still have to be done with home delivery, a woman can concentrate on childbirth at RHCs under the care of the staff. It is safer to give birth when receiving treatment from a trained and qualified midwife at a hygienic facility, having good care after childbirth.[28] These benefits have been raising willingness for giving birth at an RHC.

3.3.2 Impacts

3.3.2.1 Intended Impacts

＜Qualitative Effects＞

At the time of planning, this project was expected to contribute to improvement of the referral system in these townships.[29] However, strictly speaking, the referral system has not been established in Myanmar, as patients can go to a higher-level health facility without being referred from lower-level health facilities. Therefore, it cannot be said that this system was improved or strengthened by the effect of equipment procurement by this project. Nevertheless, through this project the health system was strengthened, and it became possible to provide more appropriate services to more patients at Township Hospitals and Station Hospitals. Patients who cannot be treated at RHCs as peripheral health facility can be treated within the same township when higher-level medical facilities accept them. It also can be said that the system for accepting patients within the same township has been established for childbirths with high risk for mothers and children, due to the possibility of these being diagnosed by antenatal care at RHCs, as well as for the case of emergency transport at delivery.

3.3.2.2 Other Positive and Negative Impacts

＜Quantitative Effects＞

This project was implemented with a direction towards the overall goal of improving people's

[27] Among the target RHCs of the qualitative study, there were no births at two sites in 2017. The reasons for not choosing childbirth at an RHC are that: customarily a woman gives birth with family and relatives around, and thus a woman feels hesitant to depend for personal care, including excrement, on RHC staff; it is difficult to go to an RHC after labor pain has started due to road circumstances; it takes time and effort to bring meals for a pregnant woman and attendant to RHCs; it is possible to receive midwife assistance at home if no abnormality is identified in antenatal cares and there is no reason to give birth at hospital; and a woman chooses childbirth at hospital rather than RHC in case of foreseen dystocia and risks. Nevertheless, in all sites, the number of people who received consultations in antenatal care at RHCs has increased, and the interests in the delivery facility are gradually increasing.

[28] Cleaning of the birth canal, sewing of external genitalia, and helping with newborn's washing and lactation.

[29] Source: Ex-ante evaluation of the project

access to primary health care and contributing to improvement of macro indicators on maternal and child health.[30] Looking at the macro indicators for maternal and child health, as shown in Table 10, the indicators for the whole of Myanmar have continuously improved from the time of planning this project (2012) to ex-post evaluation (2016)[31]. The indicators of Magway Region achieved 100% antenatal care coverage, and the number of home deliveries has decreased in about 60% from the time of planning this project (2012). The infant mortality rate and under-five mortality rate also decreased year by year. On the other hand, the maternal mortality rate is flat.

Table 10 Yearly changes in maternal and child health indicators

Indicators	2012 (Planning year)		2015 (Project completion year)		2016 (1 year after completion)	
	National	Magway	National	Magway	National	Magway
Antenatal Care Coverage (%)	-	79.3	-	100.8	-	100.0
Number of Home Delivery (cases)	-	35,735	-	23,756	-	20,602
Maternal Mortality Rate (/1,000 living births)	1.3	1.1	1.0	1.3	0.9	1.1
Neonatal Mortality Rate (/1,000 births)	6.8	-	6.3	-	6.0	-
Infant Mortality Rate (/1,000 living births)	13.9	14.9	11.4	14.3	10.5	12.0
Under-five Mortality Rate (/1,000 living births)	17.9	17.4	14.5	15.8	13.3	14.0

Source: Health Management Information System (for national level of Myanmar), Provided by Magway Region Public Health Department (for Magway Region). The column with "-" means no submitted data.

In order to verify the impacts that this project had on all target townships, the above indicators were analyzed for changes in the target townships from the time of planning (2012) to the ex-post evaluation (2017) as follows. Although, at the time of ex-post evaluation it was attempted to collect the actual values of these indicators from each township, there was no data for 2012 or 2017 and comparative analysis could not be done in some townships. For this reason, the analysis below only covers the townships where the data for both years available with the numbers shown as (n =).

- Antenatal care coverage (n=8): When comparing the planning time and project completion year, this increased in all 8 townships, of which 5 continued to increase from the project completion year. In 2017 all townships achieved 90%-100%.[32]
- Home delivery rate (n=8): Decreased in 6 townships, all of which continually declined after

[30] Source: Preparatory Study Report
[31] At the time of ex-post evaluation, the latest statistics were from 2016.
[32] They exceed the national average of 86.1% for those who received antenatal care once, and 72.3% for those received the care four times (2016) (Source: *Myanmar Demographic and Health Survey 2015-2016*).

project completion. Overall it went from 23%-65% in 2012 to 17% -51% in 2017.[33]

- Number of institutional deliveries (n=6): All 6 townships has continuously increased from planning to ex-post evaluation. In addition to the spread of government guidelines that encourage delivery at hospital for high-risk childbirths and of first and later than fourth time, subsidies from NGOs, such as for transportation expenses for hospital births.[34]
- Maternal mortality rate (n=7): Decreased in 3 townships from the planning time to project completion year. The mortality rate has increased in the other 4 townships, but the reason is unknown.
- Infant mortality rate (n=8): When the planning and project completion year are compared, decreased in 4 townships, in one of which it continues to decrease after project completion. Overall, at the time of planning in 4 townships, this rate ranged from 19 to 42 (for 1,000 living births), much higher than the national indicator (13.9), but in 2016 it tended to improve from 12 to 25 (for 1,000 living births) in 7 townships where it is higher than the national indicator (10.5).
- Child mortality rate under 5 years (n=8): When the planning and project completion year are compared, decreased in 5 townships, and in 2 of them it continued to decline after project completion. At the time of planning, 5 townships performed much worse than the national indicator (17.9) as they had 23 to 59 (for 1,000 living births). 6 townships exceeded the national indicator (13.3) even in 2016. Nevertheless, actual results show the tendency to improve as 14 to 30 (for 1,000 living births) and the difference from the national indicator is reducing.

As mentioned above, antenatal care coverage in Magway Region is now 100%. Even in the target townships, an increase in antenatal care coverage, a decrease in home delivery rate, and an increase in institutional delivery are recognized. It can be said that this is the result of supporting encouragement of institutional delivery at RHCs and hospitals through improvement of basic health infrastructure, as development of RHC facilities and equipment and improvement of equipment at Township Hospitals and Station Hospitals, as well as through diagnosis of delivery risk at antenatal care by RHCs. However, the number of townships that can be said to have reduced mortality rates in maternity, infants and children under 5 years in the region as a result of this improvement is limited. From these, it can be said that the contribution of this project on improving maternal and child health indicators in Magway Region is not remarkable.

＜Others＞

As this project was planned to develop existing health facilities, there was no impact on the

[33] Compared to the *Public Health Statistics 2016*, it is lower in 8 townships than Magway Region (45.5%) and the whole country (41.1%).
[34] It is a conditional benefit for the poor.

natural environment. Most of the newly-constructed RHCs were built on the existing land, and if new land was required it was transferred from the owner through an appropriate procedure. Resettlement did not occur and there were no complaints from residents.[35]

In this way, although the contribution of this project to improving maternal and child health indicators such as maternal mortality rate in Magway Region was not remarkable, the impact, establishment of the system for accepting patients within the township, has been realized.

From the above, this project has achieved its objectives to some extent. Therefore, effectiveness and impacts of the project are fair.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional / Organizational Aspect of Operation and Maintenance

The Ministry of Health at the time of planning of this project was reorganized into the Ministry of Health and Sports in April 2015 after the project completion, and then the Department of Health in charge of this project was divided into the Department of Public Health in charge of primary health care and the Department of Medical Services in charge of treatment. According to the health administrative division under the Department of Public Health, the Township Public Health Department supervises the services of RHCs and hospitals developed by this project. The director of Township Hospital concurrently serves as the Township Medical Officer (hereinafter referred to as "TMO"), the head of the health administration within the township. There are 4 professionals in RHCs: Health Assistant, the head of the center; Lady Health Visitor; Public Health Supervisor-2; and Midwife. There are 3 to 5 SHCs located around one RHC. This organization is the same as at planning.

Table 11 shows the allocation of health staff in each township in 2017. There are some cases in which a doctor was placed after project completion at a Station Hospital where it was vacant at the time of planning, that is to say, some improvements were seen in the situation, but in general there are insufficient doctors at all townships. 6 townships have more unfilled positions for nurses than for Health Assistants. Even when doctors have been placed, they are often transferred to another hospital for training course to raise their expertise, and the subsequent relocation is often delayed. As described in "3.3.1.1 Quantitative Effects (Operation Indicators)", there are some hospitals that have had insufficient doctors since the time of planning, and that has limited the effectiveness of this project.

[35] Based on the answers by questionnaire to each township and interviews of the health staff in the field study, and on the beneficiary's discussion in the group interviews on the changes between before and after the project, by the qualitative study.

Table 11 Percentage of staff posts filled in each township (2017)

Township	Doctor	Nurse	Health Assistant	Lady Health Visitor	Public Health Supervisor-1	Midwife	Public Health Supervisor-2
Pakokku	41%	67%	88%	100%	20%	97%	92%
Seik Phyu	42%	57%	78%	67%	20%	88%	93%
Pauk	50%	76%	100%	50%	0%	98%	88%
Myaing	57%	88%	92%	92%	50%	94%	72%
Salin	54%	88%	69%	92%	17%	65%	100%
Saw	-	-	73%	45%	14%	98%	62%
Say Toke Ta Yar	67%	70%	44%	63%	17%	87%	54%
Ya Sa Gyo	50%	47%	87%	86%	13%	96%	89%
Natmauk	43%	67%	91%	88%	40%	100%	91%

Source: Calculated by the external evaluator based on document provided by each township. "-" means no data.

The number of posts filled in the 4 professions to be placed in RHCs/SHCs are generally high. The predetermined 4 professionals are placed in 80% of the 32 newly-constructed RHCs. In 7 of them 2 Midwives and 2 Public Health Supervisors have been placed, and they have 6 members in total at one RHC. At the time of planning and project completion, there was concern that the 4 professionals would not be in place at 5 sites upgraded from SHC to RHC, but at the time of ex-post evaluation, the 4 professionals are in place at all 5 sites.[36] In this way, staffing for RHCs/SHCs has improved.

The maintenance and management system for medical equipment procured through this project was also confirmed. When equipment fails, each facility or clinical department that owns the equipment first tries to replace or repair parts locally. If this is not possible, they request for repair to the TMO and bring it to a manufacturer's agent if permission is received. However, the list of agents included in the equipment handover document of this project is not used for inquiries for repair or parts replacement,[37] and they have to look for an agency every time equipment is broken. There are problems in that there is no appropriate agency in Mandalay, which is the nearest city, and it can take time to locate one, and thus there are cases where parts are missing, or the equipment is being used without being repaired (detailed in "3.4.4 Status of Operation and Maintenance").

Regarding the maintenance and management system of the facilities developed by this project, health staff are conducting daily inspections and cleaning.[38] Regular inspections of electricity and water supply and drainage facilities are not implemented. When problems occur, repair is

[36] Data provided by each township

[37] When the external evaluator inquired JICA, it was confirmed that the companies, which procured the equipment, and the staff of the local agent of the companies informed and handed over the contact list for maintenance work to the Ministry of Health and each facility at the time of the delivery of the equipment, together with the information of manufacturing guarantee system of the equipment. However, at the time of the ex-post evaluation, the target facilities did not have this contact list. It seems that the list was not taken over or lost when the person-in-charge of the facility was transferred. When the external evaluator looked into the contact list, it was found that most agencies in the list were located in Yangon, probably, in consideration of their capacity for response for a need of repair and supply of parts; and there were no agencies in Mandalay, which the staff of the target facilities were looking for. The person-in-charge of the target facilities said that it is difficult and not realistic to hand-over equipment or bring down parts from Yangon, which is far from the facilities.

[38] In some cases, RHC hires a community resident as cleaner.

done locally. If it is not possible to complete, it is reported at a monthly meeting by representatives of all health facilities in the township. After that, when the repair is requested to the TMO and budget is secured, a technician for repair is dispatched from the Township Construction Department. For this reason, it often takes time from the occurrence of the problem until the repair. Some RHCs are located in areas where there is no electrician with appropriate skills,[39] and there are cases where only people in the community repair the in-house generators and water supply pumps and change the wiring, but the suitability of this is not assured. For this reason, some RHC staff have wanted regular inspections with specialized electricians (Refer "3.4.4 Status of Operation and Maintenance" for details).

As mentioned above, although the personnel at RHC/SHC tend to be fulfilled with respect to institutional aspects for the operation and maintenance of this project, there are unfilled positions for doctors and nurses at hospitals, and that leads to some of the equipment procured by this project not being utilized. It is a system that allows daily cleaning and inspection of equipment and facilities procured and developed by this project. However, it cannot be said it is adequate for the repair and parts replacement at the time of equipment failure as well as the inspection and repair of electricity-related facility of RHCs, and thus there are some cases in which it has not been able to repair or replace parts. As described above, there are some problems in terms of institutional and organizational aspects regarding the sustainability of the project.

3.4.2 Technical Aspect of Operation and Maintenance

This project procured the equipment, which was used by health staff, doctors and nurses at the time of planning, or those of operable for them. Interviews with the TMO of each township and with nurses and health staff of target facilities at the time of ex-post evaluation revealed that there is no equipment that cannot be operated or routinely cleaned and inspected, and there are no cases of breakage or non-use due to technical problems.

As mentioned earlier, staffing to RHCs/SHCs has increased in recent years, and the number of staff members who have just graduated from university or midwife school has also increased. The Township Public Health Department strives to gain trust from the people by strengthening knowledge and technology by frequently conducting training for inexperienced staff.

As described above, there are no technical problems in sustaining the effects of this project.

3.4.3 Financial Aspect of Operation and Maintenance

The target hospital staff of this project informed that the new administration after democratization places importance on social sector, the budget for the health sector has been increased, and thus the supply of medicines and increase in the number of health care staff are

[39] In some cases, RHC hires a community resident as repair worker.

realized. It is said that the financial situation is improving.

Figure 9 shows the township budget for 2015-2017. It was not possible to obtain the budget amount from all townships, and thus the data obtained from 4 townships was analyzed as examples.[40] The budget amount is increasing in 3 townships. The remaining one also increased in 2016 compared to 2015. Budget size differs for each township, because the number and size of facilities such as hospitals are different.

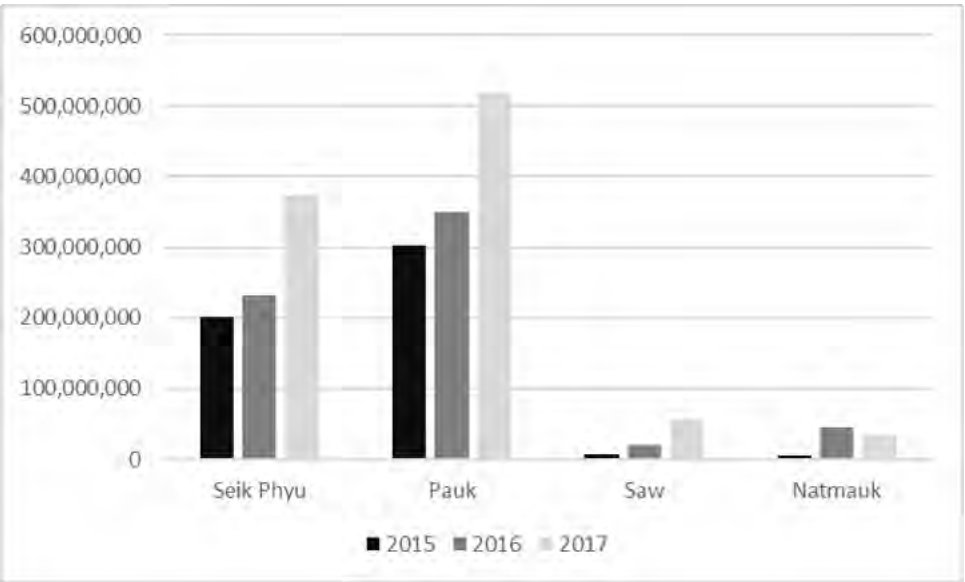


Figure 9 Township Budget Amount (Unit: Kyats)

Repair costs (for buildings and others) at each facility were confirmed. As mentioned in "3.4.1 Institutional / Organizational Aspect of Operation and Maintenance", the repair costs are not allocated to each facility in advance as a budget every year, and when there is a need for repair, it requests to the TMO. As a result, the actual repair costs of RHC allocated from the Department of Public Health varies from year to year. As an example, the actual results of RHC repair expenses for each fiscal year in Seik Phyu Township were 8,228,000 Kyats (2015), 200,000 Kyats (2016), and 580,000 Kyats (2017). Several newly-constructed RHCs have set up community funds to finance repair and smooth operation of facilities and equipment; they have accepted donations from residents and patients, and used them for purchasing regular fuel for in-house generators that are part of RHCs' electric facility. Consumables for diagnosis and delivery attendance used by RHC/SHC health staff are procured by funds and budget of UNICEF, NGOs, and the Ministry of Health and Sports. They are distributed timely and sufficiently.

Equipment repair expenses of Township Hospitals and Station Hospitals are also allocated

[40] 4 townships are Seik Phyu, Pauk, Saw and Natmauk.

based on the application as with RHCs. As a result, the actual results of repair expenses allocated from the Department of Public Health are different every year. As an example, the results of repair expenses for each year at Seik Phyu Township Hospital were 23,935,000 Kyats (2015), 1,100,000 Kyats (2016), and 56,806,000 Kyats (2017). Consumables to be used for surgery and delivery at hospitals are procured under the budget of the Ministry of Health and Sports based upon request, and they are provided in a timely fashion.

Regarding spare parts for procured equipment, as noted in "3.4.1 Institutional / Organizational Aspect of Operation and Maintenance", manufacturers' agents cannot be found in the vicinity, and it is a problem that they cannot be repaired or replaced. Nevertheless, there wre no cases that the repair or replacement could not be done due to lack of budget.

As described above, there is no problem concerning the financial aspect of operation and maintenance for this project.

3.4.4 Status of Operation and Maintenance

＜Facility of the Newly-Constructed RHCs＞

The newly-constructed RHCs have been well organized and cleaned, and maintenance inside the buildings is in good condition. A poster of the cleaning method established in this project and a sign board to prevent entering into the room before it is dried are continuously in place, and staff explained that they routinely clean and dry the delivery room and disinfect with disinfectant.

As a problem of the building at the time of ex-post evaluation, there are several facilities where doors and windows cannot be opened or closed correctly due to broken metal fittings and deterioration of installation.[41] This is due to the wood used being insufficiently dried, and people in the community had tried to open and close in the wrong way because the shape and design of the metal fittings are not common locally, and the same bracket for replacement cannot be obtained. Because they cannot lock-up the facilities properly, some are concerned about theft, and there are facilities of which cash was stolen, but particular measures are not taken.

Regarding the in-house generators procured for the newly-constructed RHCs, 6 of 10 sites visited during the field study and the qualitative study have used regular fuel, exchanged the batteries as necessary, and continued to use them without problems. However, at the time of defect liability inspection of the project, many newly-constructed RHCs have used low-quality non-regular fuel available on the street for in-house generators, causing clogging of the filter and problems in operation.[42] Even at the time of ex-post evaluation, it was reported in 7 townships that the generators are not in operation in cases where regular fuel is expensive, the

[41] Based on the answers from the TMOs, visual inspection by field study, and the group interviews in the qualitative study.

[42] Source: Document after the project completion, provided by JICA

required fuel amount is not affordable due to the inefficient and large amount of fuel consumption, and they are not used because they cannot exchange ignitor or battery.[43] Due to malfunction of the generator, there are problems such as where examination lamps and boiling sterilizers cannot be used, no lighting at the time of power outage or nighttime, and water supply pumps unable to be operated. If this is not improved, there is concern that the deterioration in quality of services becomes usual.

＜Procured Equipment＞

The equipment procured through this project is mostly used well in all facilities. In the Station Hospitals, there are cases where the fuel heating autoclave and vacuum extractor of suction manual are kept and prepared so that they can be used for frequent power outages, even where electric power was supplied after the project completion. However, the utilization of part of the equipment has the following problems.[44]

- Equipment repair / parts replacement: Out of the developed hospitals, there are some cases where parts are not procured for vacuum extractors of suction electric, operating lamps and oxygen generators which require repair or parts replacement. The vacuum extractors of suction electric which were provided only to Township Hospitals have one of the two glass bottles damaged and only one bottle is available to use at 4 of all 9 hospitals, but they have not been replaced. The examination lamps with solar battery provided to the existing RHCs require replacement of the battery, as they became weak. However, the battery cannot be exchanged at 8 out of the 17 sites. The background to these problems is that the replacement parts cannot be obtained locally or at the manufacturers' agency.
- Daily cleaning: Some hospitals have not practiced sufficient daily cleaning for equipment that has fewer cases and thus is not used frequently, such as recovery beds, newborn warmers, and phototherapy unit. However, they are cleaned at the time of use, and obstacles to medical services have not been reported.
- Unused instruments: In both newly-constructed and existing RHCs, there are some facilities in which diagnostic and delivery tools procured through this project are unopened. The main reason they have not used procured instruments is they have still been using what they used from before, or there is continuous supply of disposable tools from the government and others. In some cases, they are accustomed to use disposable kits and the boiling sterilizer cannot be used because the facility is not electrified.[45]

[43] Based on the answers from the TMOs and the group interviews in the qualitative study. How many newly-constructed RHCs are in such situations was questioned to each township, but there was no clear answer obtained and it was not possible to grasp the whole picture.
[44] In addition to visual inspection at the field study, a checklist was prepared for each facility regarding the equipment provided, and the answers were collected from the TMO in order to confirm the utilization status of the equipment.
[45] These facilities have used disposable instruments.

- No installation of delivery room at existing RHCs: There are at least 7 sites in the existing 17 RHCs where equipment and instruments related to delivery and neonatal treatment are not utilized due to the fact that the building is too small to install a delivery room. According to reports from TMOs, 5 of them are already undergoing or planning the rebuilding, and if they are completed they will be able to use the procured equipment.[46]

In this way, although the operation and maintenance status of this project is generally good, there are cases where it is impossible to repair equipment and replace spare parts, and thus they do not fulfill the original function adequately. In some of newly-constructed RHCs, there are problems in the maintenance of the generator, and thus they cannot secure services such as response to emergency and nighttime.

From the above, because of the problems in the institutional / organizational aspect and the operation and maintenance status of this project, the sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented for the objective of expanding health services and improving access to them, by developing facilities and equipment of RHCs and SHCs and by upgrading equipment of Township Hospitals and Station Hospitals in Magway Region, thereby contributing to the improvement of the referral system of the townships.

Implementation of this project is consistent with Myanmar's development policy, which is focusing on expanding provision of primary health care and basic services, and with the development needs of renewing health facilities in peripheral areas that are old and damaged, and expanding health services and improving access to the services in areas with low maternal and child health indicators. The project is also consistent with Japan’s ODA policy, which aims to support the development of health services to improve people's livelihood. Therefore, relevance of the project is high.

Both facility construction and equipment procurement were carried out as planned, and all minor changes were necessary and appropriate. Both the project cost and the project period are within the plan, and thus efficiency of the project is high.

It was found that this project contributed to the promotion of institutional delivery in the target area, because the number of institutional deliveries at the RHCs in 9 target townships of the project has increased. Safety and functionality of RHC buildings have been improved, and satisfaction of pregnant women and health staff is high in relation to improved services. An increase in antenatal care coverage, and reduction in the rate of home deliveries, also have been

[46] When confirmed with TMOs and the applicable RHCs, 2 of the existing RHCs have no plans for expansion and remodeling or relocation. In one of them, the entire village land is under the control of the Ministry of Defense and it is difficult to rebuild and relocate it.

realized in the target townships as a whole, and the project created an impact of improved structure for accepting the patients within the townships. It can be said that the higher-quality maternal and child health services became available at the target facilities of this project in general; however, the number of users of services, such as institutional delivery, has not increased from before to after the project in a part of the target RHCs, and medical treatment such as surgery has not been able to be carried out in a part of the target Station Hospitals due to the absence of doctors. This project has achieved its objectives to some extent. Therefore, effectiveness and impacts of the project are fair.

There are no cases of defects in or non-use of the equipment upgraded by this project due to the technical and financial problems from the operation and maintenance. However, there are hospitals which are short on doctors or have an inadequate system for replacing parts of the equipment and repairing the facility. Therefore, sustainability of the project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The following points are recommended.

(a) In existing RHCs there are facilities that did not utilize equipment and instruments related to delivery and neonatal treatment procured by this project. Although there are already prospects for rebuilding at 5 sites, there are still no plans for rebuilding at 2 sites. It should be recommended to the Department of Public Health that they transfer equipment and instruments that are not used in existing RHCs without rebuilding plans to other facilities and utilize them. For example, neonatal treatment equipment can be utilized in Station Hospitals that have not been provided with it, and delivery-related equipment can be used in other RHCs with an old delivery table in a delivery room. When transferring equipment and instruments, it is necessary to contact JICA and obtain approval.

(b) There are 4 Station Hospitals supported by this project where doctors have still not been placed at the time of the ex-post evaluation, and patients cannot be accepted at the higher-level medical facility of RHC which this project aimed at. The health staff working in the area feel that there are few doctors to transfer to hospitals in inconvenient rural areas, and it is important for the Department of Public Health to investigate the causes of long-term lack of doctors in these hospitals and to place doctors immediately.

(c) There are cases where the health facilities cannot repair equipment procured in this project and exchange spare parts to fulfill the original function adequately, but these facilities are unaware of where to contact for repair and parts replacement. It is desirable that the Department of Public Health investigate these situations, identify those who can repair, dispatch them to each facility, and promptly procure and exchange parts. Similar measures

are also desired for breakage of door and window metal fittings, deterioration in installation, and malfunctions of in-house power generators in the newly-constructed RHCs.

(d) In the newly-constructed RHCs of 7 townships, in-house power generators are no longer in operation, because it is difficult to purchase expensive regular fuel, fuel efficiency is low, and the ignitor and battery cannot be replaced. This causes inconvenience at times of power outage and nighttime delivery, and also affects water supply facilities indispensable for hygiene management, and thus the quality of health services will deteriorate. On the other hand, there are some RHCs that manage community funds and continuously use their in-house generators without problems, purchasing regular fuel or replacing parts. Through the leadership of TMOs, it is desirable to share such good practice within the township and between townships and lead to resolution of problems.

4.2.2 Recommendations to JICA

It is desirable for JICA to monitor the status of improvement regarding the recommendations to the executing agency.

4.3 Lessons Learned

When assistance by the project is only procurement of equipment, it is necessary to confirm the infrastructure, in which the equipment is used, are adequately developed.

In this project, the main input was for construction of new RHCs, but some facilities were only provided equipment without constructing new buildings. In these existing RHCs, it is found that childbirth delivery was not carried out and the donated equipment was not utilized in many cases. Some of the reasons would be, but not limited to; there was a problem with the safety of the building, and/or the delivery room was not in place. In the case of a cooperation plan that does not improve infrastructure but only procures equipment, it is necessary to procure equipment on condition that the infrastructure is well established so that the procured equipment can be utilized in the facilities, or that the rebuilding plan of the facility is implemented promptly after completion of the project.

It is recommended that the contact list for maintenance of the procured equipment has information on local agencies that are in the nearest cities, to which the target facility able to inquire without much difficulties.

In this project, a contact list of manufacturers and local agencies of the procured equipment was handed over to the target facility along with the operation manuals at the installation of the equipment. However, it is found in the ex-post evaluation that the contact list was not kept by the target facilities. Therefore, they are looking for an agent every time the equipment becomes malfunction, and in case it is difficult, the equipment is used without the parts or not repaired.

Moreover, many agents listed in the contact list are located in Yangon, however, the target facilities are looking for agents in Mandalay, the nearest city from the facility. According to the person-in-charge of the target facilities, it is not realistic to bring down parts from, or hand-over equipment for repair with agents in Yangon, which is far from the facilities.

It is desirable to hand-over the contact list to the target facilities, that includes information on local agencies of the manufacturer located in the nearest cities, wherever possible, to which the target facilities able to inquire and bring-down equipment without much difficulties, so that they can maintain the equipment properly. It is also desirable to securely hand-over the contact list to the target facilities, together with other hand-over documents, and advise them to carefully keep and utilize it.

End

Republic of the Union of Myanmar

FY2017 Ex-Post Evaluation of Technical Cooperation Project
"The Major Infectious Diseases Control Project Phase 1 & 2"

External Evaluator: Tomoko Tamura, Kaihatsu Management Consulting, Inc.

0. Summary

This project supported control measures against major infectious diseases such as HIV/AIDS, tuberculosis (hereinafter referred to as "TB") and malaria in Myanmar.

Throughout the project implementation period, HIV/AIDS, tuberculosis and malaria control were priority issues of the country, and the need to strengthen measures for the control was high; the project was consistent with Myanmar's development policies and development needs. Implementation of the project was urgent and duly consistent with Japan's ODA assistance policy to the country, which was promoting assistance for truly humanitarian needs. Therefore, the relevance of this project is high.

With regard to the HIV/AIDS control component, the project engaged mainly in preventing HIV infection from donated blood, expanding external quality control[1] of HIV and syphilis tests, and improving data management capability; these were among the measures for capacity enhancement of the National AIDS Program (hereinafter referred to as "NAP")[2], which was the Project Purpose of the component and created expected outputs at large. The HIV prevalence of donated blood, which was one of the indicators of Overall Goal, was maintained at the expected level, and the prevalence of HIV among the adult population showed a decreasing trend. From this, effectiveness and impact are evaluated as high. There is no problem in sustaining the effects of the project in political, institutional, technical, and financial aspects; therefore, its sustainability is high.

With regard to the TB control component, the project engaged in strengthening TB control in various aspects. However, the level of achievement of the Project Purpose, improvement of TB control measures in Yangon and Mandalay Regions[3], was moderate in both Phases 1 and 2 of the project. The decrease in the number of TB patients in both regions, which was the Overall Goal of the project, was not realized in the expected manner. Therefore, effectiveness and impact of the component was evaluated as fair. There is no problem in sustaining the effects of the project

[1] "External quality control" refers to quality and accuracy control activities for clinical tests, which are conducted by the third-party institutions; "internal quality control" refers to those conducted internally by the laboratories and testing institutions themselves.

[2] NAP is the implementing organization for HIV/AIDS control in the Infectious Diseases Control Division of the Department of Public Health.

[3] Region is one of the administrative boundaries of Myanmar at the time of the military administration. There are 7 regions and 7 states in the country. Under the regions and states, there are districts, townships and villages. After the transition to civilian administration, "regions" are called "divisions". In this ex-post evaluation report, "regions" which was used in the reports of the projects most of the time, is used.

in political, institutional, technical and financial aspects; therefore, its sustainability is high.

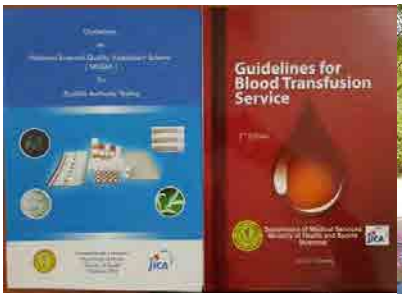
With regard to the malaria control component, strengthening the National Malaria Control Program (hereinafter referred to as "NMCP")[4], which was the Project Purpose, was realized. Reduction of numbers of malaria in-patients, serious and complicated patients, and malaria deaths, which were the Overall Goal, was realized. The effectiveness and impact of the component is evaluated as high because the planned effect was realized in this manner. There is no problem in sustaining the effects of the project in political, institutional, technical, and financial aspects; therefore, its sustainability is high.

Efficiency was evaluated for the three components together. Although the project period was as planned, the project cost exceeded the plan. Therefore, efficiency of the project is fair.

From the above results, this project was evaluated as “highly satisfactory”.

1. Project Description

Project Locations



A guideline for blood safety

A volunteer for TB control

A volunteer conducting a malaria test

Delivery of mosquito nets to remote areas

1.1 Background

This project assisted control measures against HIV/AIDS, TB and malaria, the major infectious diseases in Myanmar. During the period when Phase 1 of this project was planned, the country was under the military regime. Therefore, overseas assistance, including that for control measures against major infectious diseases, was limited. Under this situation, this project was started based on the urgency of strengthening measures against the infectious diseases prevalent in the country

[4] NMCP is the implementing organization for malaria control under the Vector-borne Disease Control (hereinafter referred to as “VBDC”) in the Disease Control Division of the Department of Public Health.

and the necessity of providing humanitarian assistance. Phase 2 of the project was started corresponding with changes in the environment, such as the democratization movement in the country and a rapid increase in international support for infectious disease control. This project was implemented over a total period of 10 years for the two phases.

1.2 Project Outline

This project had two phases, Phase 1 and Phase 2, and each phase consisted of three components: HIV/AIDS, TB and malaria control. A Project Design Matrix (PDM) was developed for each component. This ex-post evaluation covers all of these. Considering the fact that the three components were independently implemented, this ex-post evaluation evaluated the sub-ratings, such as relevance, effectiveness and impact and sustainability, for each component. Efficiency was evaluated for the three components together because there were some inputs made for entire project. The overall rating was evaluated based on the sub-ratings of the three components.

【Common for all 3 components】

Total cost (Japanese Side)	【Phase 1】1,240 million yen 【Phase 2】689 million yen
Period of Cooperation	【Phase 1】January 2005 – January 2012 (Period of extension out of the above period: January 2010 – January 2012) 【Phase 2】March 2012 – March 2015
Implementing Agency	Department of Public Health, Ministry of Health and Sports, Myanmar (It was called "Department of Health, Ministry of the Health, Myanmar" during the project period[5])
Supporting Organizations in Japan	・ National Center for Global Health and Medicine ・ The Research Institute of Tuberculosis ・ Japan Anti-tuberculosis Association (JATA) ・ Humanitarian Medical Assistance

【HIV/AIDS Control Component】

Other Relevant Organizations: NAP, National Health Laboratory (hereinafter referred to as "NHL", National Blood Center (hereinafter referred to as "NBC")		
【Phase 1】		
Overall Goal		HIV transmission is reduced nationwide.
Project Purpose		NAP is strengthened.
Outputs	Output 1	Blood safety for HIV and Transfusion Transmissible Infection (hereinafter referred to as TTI) is enhanced.
	Output 2	Quality Assurance of HIV tests and other TTIs are improved.

[5] The implementing agency was called "Department of Health, Ministry of Health" during the project period; however, it was mentioned as "Department of Public Health, Ministry of Health and Sports" in this ex-post evaluation report, even it stated about the matters happened during the project.

	Output 3	Capacity of NAP is strengthened.
【Phase 2】		
Overall Goal		Transmission of HIV and syphilis due to blood transfusion is prevented.
Project Purpose		NAP is strengthened for preventing HIV transmission through blood transfusion[6] in collaborated with NHL and NBC, and for managing data.
Outputs	Output 1	Safe blood donation is enhanced.
	Output 2	Quality of screening of HIV and syphilis is ensured.
	Output 3	Capacity of data management and analysis on HIV/AIDS control activities is improved.

【TB Control Component】

Other Relevant Organizations: National Tuberculosis Program (hereinafter referred to as "NTP")[7]		
【Phase 1】		
Overall Goal		New TB infection is controlled in Yangon and Mandalay regions
Project Purpose		TB control in Yangon and Mandalay regions is improved.
Outputs	Output 1	Capacity for program management and epidemiological data management for TB control is strengthened at central level.
	Output 2	TB laboratory services are improved.
	Output 3	Capacity for TB control is strengthened in Yangon and Mandalay regions in accordance with Stop TB strategy[8].
	Output 4	Public-Private Partnership is enhanced.
	Output 5	Communication and advocacy activities for TB control is promoted.
【Phase 2】		
Overall Goal		To halt and reverse the TB incidence by the year of 2015
Project Purpose		TB control in Yangon and Mandalay regions is improved.
Outputs	Output 1	Capacity for program management and data management for TB control is strengthened.
	Output 2	Capacity for TB control is strengthened in Yangon and Mandalay regions in accordance with Stop TB Strategy.

[6] In the PDM and reports of the project, the aim of the project in the field of blood safety was described as "prevention of transmission of HIV through blood transfusion" or "prevention of HIV infection by donated blood". However, in this evaluation report, the latter is used except for the terms in the PDM. Similarly, both "prevalence" and "positive rate" are used; however, in this evaluation report, the former is used.

[7] NTP is the implementing organization for TB control established under the Disease Control Division of the Department of Public Health.

[8] A strategic package developed by World Health Organization (WHO) globally in 1994. The core item of the package is the Directly Observed Treatment, Short course (DOTS). The main contents are (a) Commitment of the government to TB control measures, (b) Case findings by bacteria tests, (c) Patients take drugs in front of medical staff to make sure that they take them, (d) Stable supply of drugs, (e) record/ report and periodic evaluation.

【Malaria Control Component】

Other Relevant Organizations：NMCP、VBDC		
【Phase 1】		
Overall Goal		Malaria control is strengthened beyond the project sites.
Project Purpose		NMCP is strengthened.
Outputs	Output 1	Capacity of health personnel on malaria control (reporting, supply, planning and epidemiological analysis) at Region/ State, Township levels is strengthened.
	Output 2	The community-based malaria control program is effectively implemented in target areas.
	Output 3	System for prediction and management of epidemics is utilized in target areas.
	Output 4	Collaborative activities with other institutions and sectors are strengthened.
【Phase 2】		
Overall Goal		NMCP is strengthened.
Project Purpose		Implementation/ monitoring capability of NMCP are strengthened in the project area.
Outputs	Output 1	Myanmar Artemisinin Resistance Containment (hereinafter referred to as "MARC"[9]) Project is strengthened in the MARC area.
	Output 2	Community-based malaria control program is effectively conducted in Bago Region.
	Output 3	Capacity of program management in different levels of malaria and other vector borne diseases are strengthened.
	Output 4	Outcomes from the project are effectively utilized among the partners for further strengthening of NMCP.

2. Outline of the Evaluation Study

2.1 External Evaluator

Tomoko Tamura, Kaihatsu Management Consulting, Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August 2017 – November 2018

Duration of the Field Study: January 14 - 26, 2018 and March 14 - 23, 2018

3. Result of Evaluation of the HIV/AIDS Control Component

In the HIV/AIDS control component, the project worked with the major health care facilities in the country, aiming to strengthen the NAP. The project mainly engaged in preventing infection of HIV and syphilis from donated blood, improving HIV and syphilis tests, and strengthening the capacity of NAP staff. The terminal evaluation of phase 2 assessed that the project purpose was

[9] MARC is the program for preventing Artemisinin Resistance Malaria from expanding to Myanmar.

achieved, and there was a high prospect that the project would contribute to achieving the Overall Goal of reducing the prevalence of HIV and syphilis.

3.1 Relevance (Rating: ③[10])

3.1.1 Consistency with the Development Plan of Myanmar

Control of HIV was regarded as one of the most important national priorities in the National Health Plans of the country during the periods of planning and completion of both Phases 1 and Phase 2, and national programs were carried out. Therefore, the project was consistent with the development policy of the country.

3.1.2 Consistency with the Development Needs of Myanmar

At the time of planning Phase 1, the number of HIV-infected people, especially young people, tended to increase[11], and it was urgent to strengthen the operation and management functions of the NAP and introduce measures to prevent HIV infection from donated blood. At the time of planning Phase 2, HIV was ranked first in the causes of death in the country[12], and the need for strengthening control measures remained high. At the completion of Phase 2, the incidence of HIV in the country had declined; however, control of infection among the high-risk groups[13], prevention of mother-to-child transmission, treatment, care and support for infected people were very necessary; and the need for assistance continued.[14] In this way, the contents of assistance of this component was consistent with the development needs of the country throughout the period from planning of Phase 1 to completion of Phase 2.

3.1.3 Consistency with Japan's ODA Policy【Common to all 3 components】

The purpose of the project of prevention of infectious diseases falls under the category of "highly urgent and truly humanitarian projects" mentioned in the Economic Cooperation Policy for Myanmar of the Japanese government (revised in 2012) at the time of planning of Phase 1 and Phase 2. Therefore, the purpose of the project was consistent with the ODA policy of Japan.

In light of the above, this component was highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

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[10] ③: High, ②: Fair, ①: Low

[11] The peak of new HIV infections among the adult population (15 years old or more) was 2000, that of the prevalence was 2006 in the country. Source: *Global AIDS Response Progress Report Myanmar,* NAP, June 2015 (Figures 17 and 15)

[12] Single leading causes of mortality (2011), *Health in Myanmar 2013*, Ministry of Health, Myanmar (p147)

[13] MSM: Men who have Sex with Men, IDUs: Injecting Drug Users, FSW: Female sex workers were identified as high-risk groups.

[14] Source: *Global AIDS Response Progress Report*, NAP, 2015, NAP (p6-7)

3.2 Effectiveness and Impact[15] (Rating: ③)

3.2.1 Effectiveness[16]

【Phase 1】

In Phase 1, the project mainly aimed to prevent HIV infection from donated blood, improve external quality control of HIV tests, and enhance data management and monitoring of the NAP, as measures to enhance the capacity of the NAP. The project developed a blood donor registration system[17], a blood donor screening system based on a standardized questionnaire format[18], and the National External Quality Assessment (hereinafter referred to as "NEQA"[19]) for HIV and syphilis tests, which were expansively implemented all over the country. Standard operational procedure for blood transfusion screening and guidelines for quality control for HIV tests were developed; and the test method for syphilis was also improved[20]. In addition, data management and monitoring of NAP were strengthened. In this manner, all the planned outputs were achieved. The HIV prevalence of blood donors in seven major general hospitals[21] in the country, for which the indicator of Project Purpose was less than 0.5%, was largely achieved, as shown in Table 1.

From the above, strengthening the NAP, which was aimed at in Phase 1, was largely realized.

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[15] Sub-rating for Effectiveness is to be put with consideration of Impacts. (This applies to other components, too.)

[16] See the attachment for the status of achievement of the Outputs.

[17] A system for recording blood donors and their test results. NBC became able to refer to history of blood donation and test results and summarize and analyze information about blood donation by using this system.

[18] A system for screening the appropriateness of donating blood based on the result of the questionnaire survey. People who came to donate blood completed the questionnaire forms, such as past blood donation record, health condition, medical history, etc.

[19] A system for NHL, the external quality control agency, to conduct quality control of the laboratories was introduced (EQA). It was called NEQA because it began to be implemented nationwide.

[20] At that time of starting Phase 1, the syphilis test in the country was predominantly conducted as a glass slide test method called VDRL test based on flocculation precipitate reaction. However, as a result of the inspection made by JICA experts, officers of NHL and NBC, it was found that this test method was likely to produce false negatives, and was not suitable as the test for the blood transfusion service. Because of this, the project decided to introduce a quick diagnostic method that was more sensitive and less likely to produce false negatives to the blood transfusion service units in the country.

[21] The blood transfusion service was conducted by NBC, which was attached to the Yangon General Hospital, at the central level under the Department of Health at that time. There were blood transfusion units in the six major general hospitals at the regional level, named Mandalay General Hospital, Pathein General Hospital, Myitkyinar General Hospital, Magway General Hospital, Taunggyi General Hospital, and Mawlamyaing General Hospital. “Seven major general hospitals” in the PDM included NBC and the six general hospitals.

Table 1 Achievement of Project Purpose – HIV Control Component Phase 1

Project Purpose	Indicator	Status of Achievement
NAP is strengthened.	HIV Prevalence of blood donor in the seven major general hospitals of the country is less than 0.5% [22] [Largely achieved]	At the time of completion of the Phase 1 in 2011, HIV prevalence in 3 out of the 7 major general hospitals was less than 0.50%. Prevalence in the other 4 hospitals was 0.50%, 0.52%, 0.54% and, 0.55%, which was slightly above 0.50%; however, these figures were generally close to the target.[23]

【Phase 2】

As planned, a standard operational procedure for the blood transfusion service was developed, adopted by the blood transfusion service units nationwide, NEQA for HIV and syphilis tests was implemented in laboratories nationwide, and the false result rates (the rate of laboratories reporting false positives and false negatives) for HIV tests and qualitative tests of syphilis[24] in NEQA were maintained at a low level. Data management and analytical skills related to blood safety and quality management for laboratory tests with regard to the HIV/AIDS control activities were also improved. However, the false result rates in the quantitative test for syphilis did not reach the target.

The indicator of the Project Purpose, "Prevalence on HIV and syphilis of donated blood show a downward trend in the project area", was achieved for HIV, however not for syphilis (Table 2). Therefore, the achievement level of Project Purpose is moderate. [25]

From the above, the degree of achievement of strengthening NAP, which was aimed at in phase 2, is fair.

[22] If the blood tested before donating blood is positive, the blood is discarded. Therefore, the prevalence of donated blood itself does not indicate the risk of infection through blood transfusion. However, it is important to keep the prevalence of donated blood below a certain value by appropriate implementation of screening and registration of blood donors to prevent the risk that many blood donors who are in the window period are included as donors. This is what the Project Purpose of "Prevention of HIV infection of blood transfusion and enhancement capacity of data management" was aiming at.

[23] Source: Document provided by NBC.

[24] The qualitative test for syphilis judges positive and negative by rapid diagnosis test. Quantitative tests measure dilution factor (positive end point). Quantitative tests, which need dilution and stirring, require higher technical skills than the qualitative test.

[25] When the external evaluator studied the statistics at the time of the ex-post evaluation, it was found that the prevalence in 2010, which was used as the baseline figure for this indicator at the time of planning, was unreliable. There was a problem with the test method and accuracy for the syphilis test in particular at that time, and it is highly likely that false negatives were reported from each hospital. Because the reliability of the baseline figure was low, it is not possible to measure whether the prevalence rate has declined from 2010 to 2015, as shown in the indicator. On the other hand, as stated in footnote 22, the project was aiming to keep HIV and syphilis prevalence of the donated blood below a certain value. Therefore, in this ex-post evaluation, the external evaluator paid attention to whether the prevalence rate of the target year 2015 was within the target figure, which was set at the time of planning, for the evaluation of the level of achievement of the project purpose of the Phase 2.

Table 2 Achievement of Project Purpose – HIV Control Component Phase 2

Project Purpose	Indicators	Status of Achievement
NAP is strengthened for preventing HIV transmission through blood transfusion in collaborated with NHL and NBC, and for managing data.	Prevalence of HIV and syphilis of the donated blood show a downward trend in the project area. ・ HIV: from 0.6% (in 2010) to 0.4% (in 2015) [Achieved] ・ Syphilis: from 0.8% (in 2010) to 0.6% (in 2015) [Not achieved]	At the time of completion of the Phase2 in 2015, ・ It was equal or less than 0.4% in all 7 major general hospitals.[26]。 ・ It was equal or less than 0.6% in the five hospitals.[27]

3.2.2 Impact

The registration system and screening of blood donors and NEQA of HIV and syphilis tests, which were disseminated nationwide by this project, were carried out continuously even after completion of this project.[28] For the prevalence of syphilis of donated blood at the seven major general hospitals in the country, which was still a problem at the completion of Phase 2, six of them improved their performance and achieved the rates of equal or less than 0.6% at the time of the ex-post evaluation.

As a result of guidance from NHL, the rate of false result rates in NEQA of HIV tests has decreased in recent years. On the other hand, the percentage of laboratories that did not reach the target score (correct answer rate was 90% or more) in NEQA for both the qualitative and quantitative tests for syphilis did not show stable improvement (Fig. 1).

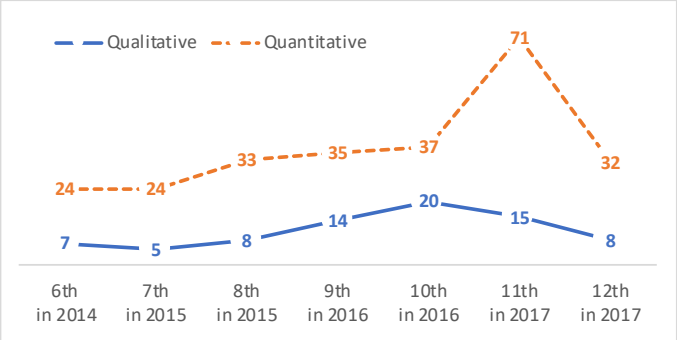

Figure 1 Percentage of laboratories that did not reach the target score in syphilis NEQA (%)
Source: Documents provided by NHL

As mentioned above, except for the instability of the technical level of syphilis tests, the major effects that were created by the project were sustained even after completion.

[26] Prevalence of HIV of donated blood was 0.2% in NBC, 0.1% in Mandalay, 0.4% in Pathein, 0.4% in Myitkyinar, 0.2% in Magway, 0.4% in Taunggyi and 0.0% in Mawlamyaing. (Source: Document provided by NBC).
[27] Prevalence of syphilis of donated blood was 0.6% in NBC, 0.8% in Mandalay, 1.7% in Pathein, 0.7% in Myitkyinar, 0.8% in Magway, 0.9% in Taunggyi and 0.4% in Mawlamyaing. (Source: Document provided by NBC).
[28] The NEQA of HIV and syphilis, which was assisted by the project, has been conducted twice a year. The annual reports of NEQA were also published continuously (See "3.4 Sustainability").

3.2.2.1 Achievement of Overall Goal

As shown in Table 3, at the time of ex-post evaluation, the national average of the prevalence of HIV of donated blood was maintained at 0.4% or less, which was the target figure. HIV prevalence of adult population has declined after 2006, which had the highest record, and it was maintained at the same level in recent years. There is no information on the prevalence of syphilis among the adult population, and it is unknown whether it was decreasing or not. Since the target figure with regard to HIV control, which was addressed intensively over the two phases, has been achieved, the Overall Goal of the project as a whole is considered to be achieved in general.

Table 3 Achievement of Overall Goal – HIV Control Component Phase 1 & 2

Overall Goal	Indicators	Status at the time of Ex-post Evaluation
【Phase 1】 HIV transmission is reduced nationwide.	Adult (15-49) HIV prevalence shows a downward trend. [Achieved]	This has the same meaning as the indicator for Phase 2, "National prevalence shows a downward trend." See the statement below.
	HIV prevalence of blood donor keeps < 0.5%. [Achieved]	National average of HIV prevalence of blood donors has been 0.1% – 0.2 % continuously since 2011; it has been equal or less than 0.4%, which was the target figure of the project.[29]
【Phase 2】 Transmission of HIV and syphilis due to blood transfusion is prevented.	National prevalence shows a downward trend. [HIV: Achieved. Syphilis: Unknown as there is no information]	HIV prevalence of adult population has declined after 2006, which had the highest recorded figure, and it was maintained at the same level from 2014 to 2017. [30] NAP expects this trend to continue. There is no survey result for the prevalence of syphilis among the adult population, and it is unknown whether it was decreasing or not.[31]

<Relationship between the project and Overall Goal "Decrease in prevalence of HIV">

This project mainly focused on preventing infection from HIV and syphilis by donated blood and improving the quality of HIV and syphilis tests, among others for strengthening the functions of NAP. These efforts are only a part of various measures for HIV/AIDS control. Yet, conducting tests with high accuracy is also important for treatment of HIV and syphilis, and prevention of mother-to-child transmission. Therefore, the project was an important effort for lowering HIV prevalence, which was the Overall Goal of the project.

[29] Source: Document provided by NBC.

[30] Source: Document provided by NAP.

[31] According to the explanation of the officer in-charge of NAP, survey of prevalence of syphilis was conducted only for high-risk groups of HIV infection and pregnant women due to the limited budget of the survey.

3.2.2.2 Other Positive and Negative Impacts

In 2014, NBC received the Developing Country Award of the International Society of Blood Transfusion in recognition of the dramatic reduction in HIV prevalence of donated blood as a result of the donor screening conducted by the project. In recognition of this award, the Ministry of Health and Sports had launched a policy to strengthen the function of NBC, and in 2015 NBC was upgraded from the position of the attached facilities of Yangon General Hospital to an independent organization.

After completion of the project, NHL became able to conduct not only molecular diagnosis of gonorrhea and chlamydial infection,[32] but also molecular diagnosis of leptospirosis[33] and CD4 test[34] of HIV by utilizing the PCR laboratory[35], which was established with the support of this project. Utilizing the knowledge and experience in NEQA gained from the project, at the time of the ex-post evaluation NHL is carrying out NEQA for CD4 s and virus load tests[36] in addition to that for HIV and syphilis.

As mentioned above, as a result of the implementation of this project, among the measures for strengthening of capacity of NAP, which was aimed at by Project Purpose, the project focused on improvements in prevention of HIV infection by donated blood, expansion of external quality control of laboratory tests, improvement of data management capacity, and these were realized as expected in general. The overall goal was largely attained, because prevalence of HIV of donated blood was maintained at the expected level, and HIV prevalence among the adult population is showing a decreasing tendency. There was an improvement in prevalence of syphilis of donated blood at NBC and the six major general hospitals, which was the Project Purpose, at the time of ex-post evaluation as compared with that at the completion of the project. There was also an impact of strengthening functions of NBC and NHL. In this way, the project created the expected effect; therefore, effectiveness and impact of this component are high.

[32] Sexually transmitted disease caused by pathogen of Chlamydia trachomatis.

[33] A bacterial infection for humans and animals caused by infection of pathogenic Leptospira.

[34] Test of CD4 positive cells (a kind of lymphocyte and immune cells that protect them against pathogens such as bacteria and viruses).

[35] A laboratory for genetic testing using the PCR method. The PCR is a test method for amplifying genes for detection, which produces highly accurate results in a shorter time than the virus separation method, which increases viruses with solvent cells and others.

[36] Inspection to measure the amount of HIV in the blood.

3.3 Efficiency 【Common for all 3 components】 (Rating：②)

3.3.1 Inputs

Table 4 and Table 5 show planned and actual inputs of the project for the 3 components.[37]

Table 4 Planned and Actual Inputs – Phase 1

Inputs	Plan	Actual		
		Originally planned period	Period of extension	Total
(1) Experts	No information	9 long-term 44 short-term 53 in total	2 long-term 10 short-term 12 in total	11 long-term 54 short-term 65 in total
(2) Equipment [38]	No information	266 million yen (USD2,938,000)	14 million yen (USD171,000)	280 million yen (USD3,109,000)
(3) Training in Japan	Around 5 persons every year	25 persons	0 persons	25 persons
(4) Training in the third party countries	No information for number of participants	46 persons	6 persons	52 persons
Japanese side project cost in total	850 million yen (for the first 5 years)[39]	850 million yen	390 million yen	1,240 million yen
Myanmar side project cost in total	Amount is unknown. There was input, such as project offices and cost of electricity, telephone, and water supply for the offices.	Amount is unknown. There was input, such as project offices and cost of electricity, telephone and water supply for the offices.		

[37] Source of information about the planned inputs are documents provided by JICA; those for actual are the terminal evaluation reports for the two phases.

[38] Actual cost for the equipment provided was calculated by converting the US Dollar amount into Japanese yen. The exchange rate used for the conversion was the IMF average mid-term exchange rates of the last month of each year during the relevant project period (Source: IMF International Finance Statistics Database). It was 1USD=90.65JPY for the originally planned period, 1USD=79.27JPY for the period of extension and 1USD=118.31JPY for the Phase 2.

[39] Planned project cost for the period of extension is not known as there is no relevant document.

Table 5　Planned and Actual Inputs – Phase 2

Inputs	Plan	Actual
(1) Experts	No information about the number of long-term (180MM) 6 – 9 for short-term	6 long-term 18 short-term 24 in total
(2) Training in Japan	6 persons	No
(3) Training in the third-party countries	15 persons	10 persons
(4) Equipment	No information	157 million yen (USD1,326,112)
Japanese side project cost in total	574 million yen	689 million yen
Myanmar side project cost in total	Amount is unknown. There were inputs, such as project offices and cost of electricity, telephone and water supply for the offices.	Amount is unknown. There were inputs, such as project offices[40], cost of electricity, telephone and water supply for the offices, cost for training, test equipment, test reagent and consumables for tests.

3.3.1.1 Elements of Inputs

The actual elements of inputs, such as experts, training, equipment provision, etc. cannot be quantitatively compared with the plan, because some quantities are not described at the time of planning. However, the elements of input were generally the same as planned. The main equipment provided by the project is shown in Table 6. Major inputs of the Myanmar side were assignment of the counterpart officers, provision of project offices, transportation expenses of officials of Myanmar at the time of the surveys and others. It was generally as planned.

Table 6　Main Equipment Provided by the Project (Phases 1 and 2)

HIV/AIDS	Test equipment, test kits/ consumables, refrigerator for blood bank and renovation of a training room
TB	X-ray machines / projectors, microscopes, fluorescence microscopes, consumables, and computers
Malaria	Malaria test kits, micro pipettes, malaria treatment drugs, long-lasting insecticidal nets, computers, GIS software and renovation of an entomology laboratory.

3.3.1.2 Project Cost

The actual project cost of Phase 1 exceeded the plan (146%); however, it cannot be measured whether the increase of inputs was corresponding to the increase of outputs, because the planned amount of project cost for the extension period is unknown. The actual amount of project cost

[40] The project office for HIV/AIDS control components was bared by Japanese side.

exceeded the planned amount for the Phase 2 (120%). From this, it was evaluated that the project cost exceeded the plan.

3.3.1.3 Project Period

Table 7 shows the planned and actual project period.

Table 7 Planned and Actual Project Period

Phases	Planned period calculated at the time of project planning	Actual		
		Originally planned period	Period of extension	Total
Phase 1	January 2005 - January 2010 (5 years)	January 2005 – January 2010 (5 years)	January 2010 – January 2012 (2 years)	January 2005 – January 2012 (7 years)
Phase 2	February 2010 – February 2015 (5 years)	March 2012 – March 2015 (3 years)		

In this ex-post evaluation, it was not concluded that the project period "exceeded the plan" from the fact that the Phase 1 has been extended for two years. It was concluded “as planned (100%)", by comparing the total period expected for the two phases, which were calculated at the time of planning for each phase, i.e. “10 years = 5 years (Phase 1) + 5 years (Phase 2)”, with the actual period of both phases, i.e. “10 years = 7 years (Phase 1 + Phase 1 extension) + 3 years (Phase 2)”. The reasons for this conclusion are as follows:

- The expected period of Phase 1 was 5 years at the time of planning. The initial project purpose of Phase 1 was almost achieved as a whole around the end of the project period of five years. However, at the end of the 5-year implementation period of Phase 1 (before phase 1 extension), it was planned to carry out Phase 2 for 5 years because further strengthening of the implementing agencies' capacity was necessary. From this, it was found that the total of the planned periods calculated at the time of planning of each phase was "10 years = 5 years + 5 years".
- However, there was a possibility that the procedures for the start of Phase 2 would be delayed, due to the general election scheduled in the country at that time. Therefore, in order to implement uninterrupted cooperation, Phase 1 was extended for two years and the project activities were continued. After that, Phase 2 was carried out for three years from 2012 after the general election. Thus, the extension of Phase 1 was a measure to implement uninterrupted cooperation in consideration of the change in the political situation of the country at the time; it is considered that the extension of Phase 1 (2 years) was pre-engagement of the portion of the planned Phase 2 (5 years).
- The project expanded the planned outputs during the extension of Phase 1, which can be a lead to Phase 2. Phase 2 planned higher targets compared to those for Phase 1.

In light of the above, although the project period was within the plan, the project cost exceeded the plan. Therefore, efficiency of the project (for the 3 components as a whole) is fair.

3.4 Sustainability (Rating: ③)

Among the measures for strengthening NAP, the sustainability of the main effects of the project, such as prevention of HIV and syphilis infection by donated blood and NEQA of HIV and syphilis tests, were analyzed as follows.

3.4.1 Policy and Political Commitment for the Sustainability of Project Effects

At the time of the ex-post evaluation, the country has formulated the *HIV/AIDS National Strategic Plan (2016 - 2020)*, which has a policy to further strengthen and continue countermeasures for HIV/AIDS. NAP conducts data management and monitoring of activities in accordance with national and regional monitoring plans. The measures introduced by the project, such as the blood donor registration and screening systems by questionnaire, have been continued even after the project. NEQA for HIV and syphilis test has also been conducted twice a year, and its reports were published continuously. The number of laboratories participating in NEQA has also increased. All of these systems are established, and they are most likely to be continued in the future. In this way, the policy system and political commitment necessary for sustaining the effect of the project is in place.

3.4.2 Institutional Aspect for the Sustainability of Project Effects

The organizational structures of NAP, NBC and NHL are the same as those at the time of planning. NAP is located under the Infectious Disease Control Division of the Department of Public Health in the Ministry of Health and Sports, and is responsible for planning, monitoring, evaluation, management, technical enhancement, and others of HIV/AIDS control. There are AIDS/STD (sexually transmitted diseases) teams in major townships throughout the country, which are conducting countermeasures for AIDS and STD in the townships. The responsible organizations for blood safety are the NBC located in Yangon, and a total of 152 (as of 2016) transfusion service units established in the hospitals in the country, which have 200 or more number of beds. NHL is responsible for implementation, evaluation, and reporting of NEQA of HIV, syphilis and other tests. Each of these institutions has clear roles and responsibilities.

According to explanations from responsible persons of NAP, NBC and NHL, there are vacancies in the staff allocation, and there is a shortage of staff; however, with regard to the activities related to blood safety and NEQA, which were introduced in the project, there were no delays as a result of staff shortage.

Of the 34 blood transfusion units (BTUs) where the computerized blood donor registration system was introduced by the project, only NBC and the BTU of Mandalay General Hospital are using the system for the purpose of screening blood donors (see photo). The other 32 BTUs are using the system only for summarizing data and reporting. These BTUs are located in the laboratories of each hospital, and staff members allocated for the laboratory are conducting blood transfusion services when needed. This is to say there are no dedicated staff for the blood transfusion service, and there is a shortage of capacity for undertaking data input work at the reception of blood donation. This is the background behind the fact that the system has not been fully-utilized. At the time of the ex-post evaluation, the government of Myanmar was considering a plan to strengthen the organizational structure for the management of the blood transfusion service, including allocating persons in-charge of the service at each hospital. It can be expected that safety of the donated blood would be further increased by utilizing the above-mentioned system, when this plan is realized.

Thus, there is room for improvement in the organizational structure of the management of the blood transfusion service; however, the institutional arrangements necessary for sustaining the effect of the project has been established in general.

3.4.3 Technical Aspects for the Sustainability of Project Effects

NAP has sufficient technical skills to analyze data collected from all over the country, and develop strategies by referring to these data and monitoring results of the activities conducted; there seem to be no technical problems.

There were no technical problems concerning the registration system and implementation of the screening of blood donors by ways of questionnaire and HIV and syphilis tests, which are conducted at NBC and the BTUs in all over the country. NBC has techniques necessary for utilizing the outcome of this project expansively. For example, at the time of the ex-post evaluation, NBC constructed a database in the computerized blood donor registration system introduced in this project, identified a low-risk group of HIV and syphilis infection, and implemented activities for creating motivation and promoting recruitment to obtain volunteer donors from the group, for the purpose of improving safety of the donated blood. In addition, in 2018 NBC issued a second edition of blood transfusion service guidelines, which were originally issued with assistance from the project, by adding matters concerning clinical use of blood products.

NHL has the technical skills necessary to continue and expand the outcome of this project. The test equipment provided by the project and the practical training room, which was renovated with support from the project, is frequently used. Status of maintenance of this equipment and training room is also good. As described in "3.2.2.2 Other Positive and Negative Impacts", NHL became able to conduct several new tests by using the PCR laboratory established by the project. The

types of tests for NEQA was also increased. As a result of guidance from NHL, the false result rate in NEQA for HIV test has decreased in recent years.

As stated in "3.2.2. Impact", the percentage of laboratories that did not reach the target score in syphilis NEQA for both qualitative and quantitative tests did not show a stable improvement. This is mainly due to insufficient technical training to laboratories newly participating in NEQA.[41]

In this way, although there is a need to continue and strengthen training for technical improvement of syphilis tests, NAP, NBC and NHL are generally equipped with the necessary techniques for sustaining the effect created by the project.

3.4.4 Financial Aspect for the Sustainability of Project Effects

The total expenditure of NAP in 2016/17[42] was 16,689 million yen (109 million USD), and the breakdown of contribution was 2,450 million yen (16 million USD) from the government budget, 10,871 million yen (71 million USD from the Global Fund to Fight AIDS, Tuberculosis and Malaria (hereinafter referred to as "GF")[43], and 3,368 million yen (22 million USD) from other multilateral and bilateral donor agencies.[44] Until 2017/18, both the government budget and donor assistance tended to increase year by year. Assistance of GF, the biggest donor, has been committed until 2020[45]; and therefore, there will be no impact on the sustainability of the effect of the project, even though some reduction in amount is anticipated in the future.

Since 2013, HIV test kits were procured by the government budget; there was no shortage in numbers. The budget allocation for the syphilis test kits had been suspended for a time; however, the budget has been increased since fiscal year 2016, and the number of kits procured has also increased. As described in "3.2.2.1 Achievement of Overall Goal", a survey on prevalence of syphilis in the adult population has not been conducted. NAP has been negotiating with the Ministry of Health and Sports to increase the budget and conduct the survey.

All the operations of NBC are covered by the government budget, and there was no financial problem. The participating laboratories for NHL and NEQA spend the general budget given to

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[41] Some laboratories do not have rotators used for quantitative testing. It is more difficult to ensure accuracy when the tests are conducted by manual stirring.

[42] The fiscal year of Myanmar is from April to March of the following year. In this report, for example, the fiscal year from April 2016 to March 2017 is indicated as 2016/17.

[43] It is a global fund established in 2002 with the aim of providing financial support necessary for measures against HIV, TB and malaria. Assistance to Myanmar was temporarily suspended for political reasons in 2005 and resumed in 2011. The contribution of GF is distributed to government agencies including NAP, NTP and NMCP, NGOs and international organizations in the country.

[44] Source: Document provided by NAP. The US dollar amount described in the document was converted into yen at the IMF rate (1 USD = 135.11 yen) of March 2017.

[45] The UNOPS (United Nations Office for Project Services) and Save the Children, the principal receiving agencies of GF in Myanmar, and GF had already signed an agreement on financial assistance for three diseases for the period from 2018 to 2020. (Source : https://pr-myanmar.org/en/news/global-fund-nfm-2-grant-agreements-2018-2020-signed, accessed on May 23rd, 2018.) Allocation of GF is disbursed to the Ministry of Health and Sports of Myanmar through UNOPS.

the laboratories for the expenses related to NEQA; there was no major problems so far. In this way, the financial resources necessary for sustaining the effects created by the project are secured.

No major problems have been observed in the policy background and the organizational, technical, and financial aspects. Therefore, sustainability of this component is high.

4. Result of Evaluation of the Tuberculosis Control Component

In the TB control component, capacity enhancement of the central-level staff, improvement of sputum smear microscopy[46], operational research[47] of community-based TB care (hereinafter referred to as "TBCBC") and drug seller referral (hereinafter referred to as "DSR[48]") and others were conducted to improve the TB control program in Yangon and Mandalay regions.

It was evaluated that the indicators of Project Purpose were partly achieved or expected to be achieved in the terminal evaluation of the Phase 2. In addition to this, it was concluded that the TB control program was strengthened and the Project Purpose was achieved, because the target figures for an increase in the number of examinations conducted for suspected TB patients, that for the reduction of Case Detection Rate (hereinafter referred to as "CDR"), and that for Treatment Success Rate (hereinafter referred to as "TSR") were achieved, according to the statistics of the target area up to 2013.[49] It was concluded that the number of TB patients, to be changed from increasing to decreasing trends, which was the Overall Goal, needs further observation.

4.1 Relevance (Rating：③)

4.1.1 Consistency with the Development Plan of Myanmar

Control of TB was regarded as one of the most important national priorities in the National Health Plans of the country during the periods of planning and completion of both Phases 1 and

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[46] Sputum TB microscopy test is a test in which sputum (sputum from the mouth) is stained red by Ziehl-Neelsen method for confirming existence of acid-fast bacteria with a microscope. A patient who shows positive by this test is called a smear positive patient, a negative patient is called a smear negative patient.

[47] In the project, operational research was defined as "research activities conducted for formulating and introducing appropriate countermeasures for certain tasks" (Source: *Terminal Evaluation Report at the end of Phase 1* (before the extension), p11).

[48] Drug sellers referral (DSR) means referral by drug stores or pharmacies.

[49] CDR is the ratio of the patients detected out of the estimated number of TB patients in the country. Estimated number of TB patients is calculated based on existing surveys and statistics and announced annually by WHO.
TSR is the percentage of the patients who completed treatment and was sputum smear positive at the end of the initial intensive treatment but was smear-negative for 0 or 1 times during the maintenance treatment period and have no smear result at the end of the treatment. In the past, CR (cure rate) was used as a statistical indicator for measuring the success of treatment. CR is the percentage of the patients, who was initially smear-positive and completed the treatment and was smear-negative at least twice during the maintenance treatment period, of which one should be the result at the end of the treatment. In this way, CR is a statistic that defines cure based on the results of sputum TB microscopy test during treatment and completion of treatment, whereas TSR is a statistic that includes those who are considered to be cured, regardless of the result of sputum microscopy test. Therefore, in recent years, instead of CR, TSR, which is a statistic covering wider range of patients, has been used.

Phase 2, and national programs were carried out. Therefore, the project was consistent with the development policy of the country.

4.1.2 Consistency with the Development Needs of Myanmar

Throughout the period from planning of Phase 1 and 2, to the completion of the Phase 2, Myanmar was listed as one of the 22 high-burden TB countries in the world by WHO. Also, during the period of planning of Phase 1 and 2, TB was the fourth leading cause of death in the country.[50] At the time of planning the Phase 1, the operation and management function of TB control measures at the Ministry of Health and Sports and the state/region level was insufficient, and it was necessary to improve the implementation method of DOTS[51] and to strengthen quality assessment of TB testing continuously. At the time of planning Phase 2, it was highly necessary to improve patient's access to the tests, and promote early detection of TB patients with cooperation from the community. On completion of Phase 2, TB prevalence in the whole country was on a downward trend; however, the mortality rate had not decreased and there was still a need for assistance.[52]

In this way, the contents of assistance of this component was consistent with the development needs of the country throughout the period from planning of Phase 1 to completion of Phase 2.

4.1.3 Consistency with Japan's ODA Policy

See "3.1.3 Consistency with Japan's ODA Policy".

This component was highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

4.2 Effectiveness and Impact (Rating：②)

4.2.1 Effectiveness

【Phase 1】

The planned outputs of the project, such as capacity enhancement of central-level staff through joint implementation of National TB Prevalence Survey and implementation of operational research (Output 1), improvement of sputum smear microscopy by introducing NEQA by using

[50] Sources: *Annual Hospital Statistics Report 2004*, Ministry of Health, Myanmar, for the information of the planning of Phase 1, and *Health in Myanmar 2013*, Ministry of Health, Myanmar, for the information for the completion of Phase 1 and planning of Phase 2.

[51] DOTS is the abbreviation for Directly Observed Treatment with Short-course Chemotherapy. It is a treatment method for patients to take anti-tuberculosis drugs in front of health staff and to confirm taking the medicine, which is the most important measure for the strategy for TB control which is promoted by WHO globally. At the time of Phase 1 planning, there was a problem with patients taking anti-tuberculous drugs not being able to be observed continuously in implementation of DOTS in Myanmar; it was necessary to continuously confirm patients taking the drugs and guide them to successful treatment.

[52] Source: Mid-term Review Report of the Phase 1, pi.

the Lot Quality Assurance System (hereinafter referred to as "LQAS")[53] (Output2), strengthening TB control program by holding regular meetings and implementing training for counseling method for staff members (Outcome 3), promotion of patient referrals from private medical institutions (Output 4), and promotion of communication and advocacy activities through creation of educational materials (Output 5), were realized almost as expected.

These results led to improvements in the TB control program, and, as shown in Table 8, at the time of completion of Phase 1, CDR, which was one of the indicators of the Project Purpose, reached equal or more than 70% in both Yangon and Mandalay regions. However, CR (see footnote 49), which was another indicator of the Project Purpose, almost reached the target figure but decreased in 2012 in Yangon and CR in Mandalay did not reach the target.[54]

Table 8 Achievement of Project Purpose – TB Control Component Phase 1

Project Purpose	Indicator	Status of Achievement
TB control in Yangon and Mandalay regions is improved.	By 2012, CDR>70% and CR>85% will be sustained in Yangon and Mandalay regions. [Partly achieved]	・ CDR reached the target figure in Yangon and Mandalay. ・ CR almost reached the target figure in Yangon, however, this decreased in 2012. CR did not reach the target figure in Mandalay.

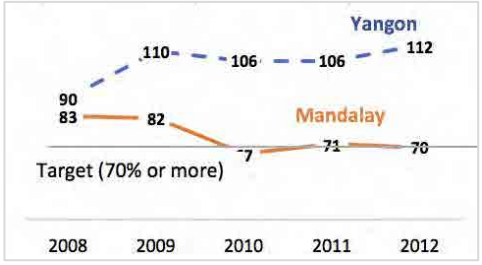


Figure 2 CDR

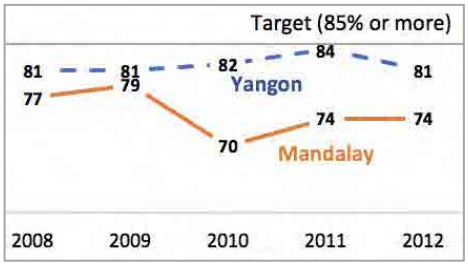


Figure 3 CR

Source: Document provided by NTP

As mentioned above, improvement in the TB control program expected by the project was almost realized; however, problems relating to CR remained, and the degree of achievement of

[53] Laboratories in the country participating NEQA for the sputum microscopy test used to submit all positive samples and 10% negative samples to the NEQA center. However, as the number of tests increased year by year, the workload of NEQA also increased, and the burden on participating laboratories and NEQA centers increased. Therefore, it was proposed with leadership from the project to conduct the NEQA using a new sampling method, i.e. LQAS. This method scientifically extracts only 10% of positive and negative samples and submits them to the supervising laboratory. As a result, the work burden was reduced while keeping the functionality in the quality control.

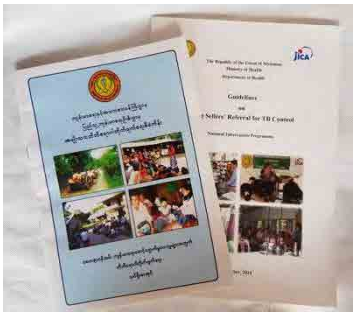
[54] The main reason why CR did not reach the target was that there were more places where people had difficulty in accessing test services and medical facilities in the vast area of Mandalay region; a lot of HIV-TB complicated patients, which are difficult to cure, were staying in the region since HIV treatment facilities were opened in the region in 2007; and there was a large migrant population seeking jobs, who tend to move to other areas during treatment. (The treatment period of TB can be as long as at least 6 months, and it is important to definitely take anti-tuberculous drugs for complete recovery. Due to side effects that may occur, such as liver dysfunction or allergic reactions, in order to complete the treatment, it is necessary to ensure continuous treatment with consultation with a doctor.)

Project Purpose of Phase 1, and level of achievement of strengthening of NTP aimed at in Phase 1, is moderate.

【Phase 2】

The National TB Prevalence Survey carried out from 2009 to 2010 found that CDR was low and TB prevalence rate was high in areas where people had difficulty in accessing hospitals and where awareness of TB among the people was not created sufficiently; there were many people who visited a drug store, instead of a public medical institution, when they have a chronic cough. In response to this, in Phase 2 operational research on CBTBC and DSR was conducted in 6 townships in total, to promote finding cases and treatment. In addition, the project introduced sputum smear microscopy at five station hospitals.[55]

CBTBC is a system for trained volunteers to encourage suspected TB patients in the area to have tests and support treatment. At that time, CBTBC was implemented by NGOs and others in the country; however, there was no uniform guidelines for the method of implementation and reporting. NTP was identifying a need to verify the effect of CBTBC and position CBTBC as one of the national TB control measures, and therefore, worked on this task in the project. DSR was the first attempt in the country where drug stores referred TB suspects to health facilities. CBTBC was conducted at two townships and DSR conducted at five townships (both were conducted at one townships).



Based on the result of CBTBC conducted by the project and opinions of the NGOs and others, who were implementing CBTBC, NTP developed CBTBC training guidelines for NGOs in 2013 (left one of the photos). These guidelines provided guidance for implementation, monitoring and reporting of CBTBC in the country. In this project, a DSR guideline was also developed as planned (right one of the photos)

As Table 9 shows, there were some townships where project activities were conducted that did not achieve the expected effect; therefore, some indicators of Project Purpose were only partially achieved.

However, it was clarified that these programs were effective in identifying cases, because all the indicators show that the numbers of suspected TB cases, tests conducted, smear positive patients, and all forms of TB patients detected increased after implementation of CBTBC and DSR compared with the numbers before the implementation. The aim of the operational research carried out in this project was to show the effectiveness of the two programs and to develop guidelines; therefore, the purpose of the researches was fulfilled.

[55] Health facilities in the country are, from largest to smallest, General Hospitals, Regional Hospitals, District Hospitals, Township Hospitals, Station Hospitals, Rural Health Centers and Sub Rural Health Centers.

Table 9 Achievement of Project Purpose – TB Control Component Phase 2

Project Purpose	Indicator	Status of Achievement
TB control in Yangon and Mandalay is improved.	(1) More than 70% in CDR and more than 85% in TSR are achieved or sustained in implementing Townships by year 2015 [Largely achieved]	Instead of CDR "Increase in the number of new smear positive patients after CBTBC or DSR introduction" was used as an indicator.[56] It was expected to increase at 6 townships, where CBTBC or DSR was introduced, and it increased at 5 townships. The TSR was expected to become 85% or more at the 11 townships where project activities were conducted (6 townships where CBTBC and/or DSR was introduced; and 5 townships where sputum smear microscopy was introduced in station hospitals). Among them, TSR of 8 townships were 85% or more.
	(2) CDR in implementing Township by DSR is increased by 3.2% [Partly achieved]	Instead of CDR, "All forms of TB patients detected"[57] was used as an indicator. It was expected to be increased by 3.2% or more at the 5 townships where DSR was introduced. It increased by 3% or more in 3 townships out of the 5.
	(3) Case detection in implementing townships by CBTBC is increased by 3.2% [Partly achieved]	Instead of CDR, "All forms of TB patients detected" was used as an indicator. There was an increase of 4.3% and 6.1% in 2 townships respectively where CBTBC was introduced.
	(4) Examination of TB suspected cases in implementing Townships in Yangon and Mandalay Regions is increased by 10%. [Partly achieved]	It was expected to be increased by 10% at the 6 townships, where DSR or CBTBC was conducted. 2 townships had an increase of 10% or more.

[56] At the time of the termination evaluation, it was concluded that there was a problem with using the CDR as an indicator of the Project Purpose due to the following reasons: (a) It is inappropriate to use CDR, which uses national prevalence common to the entire country for calculation, for analysis and comparison of the current situation in each region; (b) When the prevalence is greatly revised as a result of national prevalence surveys and others, CDR will be greatly increased or decreased due to the influence of the result. In other words, since CDR may increase or decrease irrespective of the progress of TB control program, they are not adequate for monitoring and evaluation of the program. NTP calculates and uses CNR (Case Notification Rate) instead of CDR as an indicator of case findings after 2016, according to instructions of WHO.

[57] "All forms of TB patients" are those who were confirmed as bacteriological positive. Bacteriological positive is confirmed by through the Gene Expert Test. The result of this test is available within 2 hours; it takes around 1 day to obtain results from sputum smear microscopy, which can confirm resistance to rifampicin, an anti-TB drug, as well as TB bacterium. Because of these advantages, the Gene Expert Test has been recommended by WHO in recent years. As of March 2018, the test is available in 74 medical institutions in Myanmar.

<An Example of introduction of sputum smear microscopy to station hospitals >

There was an important activity in Phase 2 in addition to CBTBC and DSR. The project introduced sputum smear microscopy at the peripheral medical facility to identify cases and encourage treatment by improving patient access to TB test services. The project introduced sputum smear microscopy at five station hospitals. The following example is from Khathiya Station Hospital (photo) in the Yangon Region, which the external evaluator visited during her site visit in the ex-post evaluation.

Previously, the hospital could not carry out sputum smear microscopy, and medical officers at the hospital asked suspected TB patients to undergo tests at the nearest townships hospital. This was 50 km away, and the road was bad and difficult to travel along. Therefore, some patients did not go for the tests even if they were asked to. TB patients needed to be examined regularly even during treatment, and the patients found it difficult to get to the hospital because it was far away.

To reduce the above problems, improve identification of cases and encourage treatment, sputum smear microscopy was introduced to the hospital with support from the project in 2011. Since there was no laboratory technician assigned to the hospital, a public health service officer was appointed and trained as staff in-charge of the sputum smear microscopy. It was decided to use the microscope owned by the hospital.

According to the record of testing in 2013, 10 to 20 tests were conducted every month, and 1 or 2 new TB positive patients were detected. At that time, the hospital had never issued major errors in NEQA. It is clear that the hospital conducted highly accurate examinations and contributed to the identifying cases and treatment of TB patients.

This project showed the effectiveness of CBTBC and DSR; and the guidelines, which were developed by the project, denoted future direction of the both programs. Improved patient access to test services was also realized as expected by introducing sputum smear microscopy with high accuracy to the peripheral medical facilities.

On the other hand, as stated at the beginning of this chapter, the terminal evaluation concluded that the TB control program in these regions had improved, because the number of suspected TB cases had increased and the figure of TSR had met the target, according to the statistics of the target area up to 2013.[58] This verification method was used because the Project Purpose of the project was "TB control in Yangon and Mandalay is improved" although the indicators of the Project Purpose were related only to CBTBC and DSR. Therefore, in the ex-post evaluation, to verify whether the TB control program in these regions had improved, the number of TB suspects who underwent tests and figures of TSR were studied up to the time of project completion (2015). As a result, it was found that the number of suspected cases who underwent tests has decreased

[58] In the terminal evaluation, the trend of CDR was also considered for evaluation. However, it was not considered in the ex-post evaluation because it was concluded in the terminal evaluation that using CDR for an indicator for Project Purpose is inappropriate, as explained in footnote 56.

in 2014 and 2015 after increasing in 2013; the TSR was 83% in 2015, which has not reached the target value.

Based on this, the degree of achievement of the Project Purpose of Phase 2 is evaluated to be moderate.

4.2.2 Impact

In order to verify the status of contribution of this project for achieving the Overall Goal, the CDR of Yangon and Mandalay Regions (target of this project was 70% or more), TSR (WHO's target is 85% or more), which was used on behalf of CR, were studied at the time of the ex-post evaluation.

Although CDRs remained the same or were declining in both regions until 2014; this increased greatly in 2015 as a result of promoting activities to identify patients by dispatching mobile medical teams[59] to villages, and others. [60] TSR was more than 85% continuously and met the target in Yangon recently; however, it was 83% and did not meet the target in 2015 and 2016. TSR in Mandalay has been in the range from 83% to 85% with some fluctuation. In this manner, the results in both regions are not far from the target; however, it cannot be said that they have achieved the target stable goals consistently. According to the explanation of the officer responsible for NTP, there was no remarkable improvement in the indicator mainly because it is difficult to provide treatment to the migratory labor population and MDR TB patients.[61]

CBTBC was conducted at 221 townships nationwide by NGOs at the time of ex-post evaluation. The Myanmar Health Assistant Association (hereinafter referred to as "MHAA"), a local NGO, which the external evaluator visited during her visit to the country in the ex-post evaluation, utilized the CBTBC training guidelines, which had been developed with assistance from the project, provided training on CBTBC to volunteers, and carried out monitoring and reporting of the activities based on the guidelines. It was apparent from the achievement of MHAA that CBTBC plays an important role in identifying cases.[62] At the time of the ex-post evaluation, Population Service International (PSI), an international NGO, was implementing DSR in 34 townships throughout the country; and the guidelines developed by the project was utilized for training of volunteers. The NTP was implementing monitoring and impact measurement of CBTBC and DSR and shares relevant information among the stakeholders at regular meetings.

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[59] The mobile medical teams consist of medical staff including physicians and visit villages by vehicles loaded with test equipment such as microscopes and X-rays to find and diagnose patients.

[60] Since 2016, Myanmar uses CNR without using CDR. CNR in 2016 was 504 and 187 in Yangon and Mandalay respectively, which met the target figure of 450 and 175 respectively.

[61] MDR is an abbreviation for Multi Drug Resistance. This refers to patients who are infected with multi drug-resistant BT, which is resistant to rifampicin and isoniazid anti-TB drugs that are used for standard treatment of TB and have the strongest anti-TB effect.

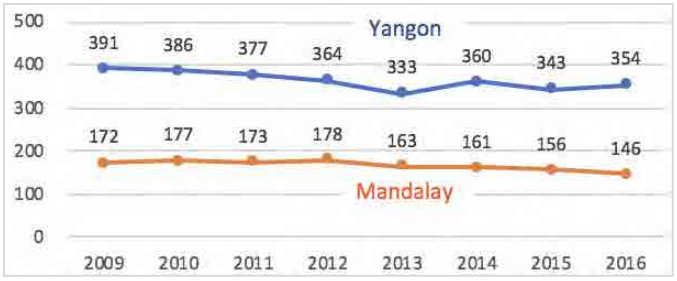
[62] In the area of activity of MHAA, the total number of confirmed TB patients referred by CBTBC accounts for 38% of the total number of such patients detected in the area.

In this way, the outputs of this project were utilized and contributed to expanding its area of implementation at the time of the ex-post evaluation.

4.2.2.1 Achievement of Overall Goal

Status of achievement of Overall Goals of the two phases are shown in Table 10.

Table 10 Status of achievement of Overall Goals – TB control component Phases 1 and 2

Overall Goals	Indicators	Status at the time of the ex-post evaluation[63]
【Phase 1】 New TB infection is controlled in Yangon and Mandalay regions	(1) No. of new smear positive TB detected reaches a plateau. [Partly achieved]	Although it was in a stable status in Mandalay after 2009; however, in Yangon, it was in a decreasing trend, and rapidly increasing in 2016 and cannot be considered having been in a stable status. The rapid increase was because the case finding was promoted as a result of dispatch of mobile medical teams and others.
	(2) Increasing notification rate of new smear positive TB slows down. [Partly achieved]	It was in a decreasing trend on and after 2010 in Yangon, and almost no change in 2014 and 2015, and was greatly increased in 2016. It was not considered to have been on a decreasing trend. It was maintained at almost same level in Mandalay.
【Phase 2】 To halt and reverse the TB incidence by the year of 2015. [64]	(1) New smear positive TB detected is maintained. [Partly achieved]	See Indicator (1) of Phase 1.
	(2) Case notification rate (all forms of TB) is increased up to 2015 and shows a downward trend. [Partly achieved]	It was slightly on a downward trend in Mandalay. It was maintained at almost same level in Yangon. (Figure 4)  Figure 4 Case Notification Rate (all forms of TB patients) (per 100,000 population)

[63] Source of the information at the time of the ex-post evaluation is the document provided by NTP.

[64] The project aimed to increase the number of patients in Project Purpose and aimed at the number turning to a decrease in Overall Goal in Phase 2. This was because the project expected the number of patients to be increased due to activities to identify cases and improved access to medical facilities, and, thereafter, expected the number to start decreasing as a result of effect of prevention of infection.

The country has a policy to include not only sputum smear positive patients, but also all forms of TB patients as an important group for provision of treatment in recent years. [65] Therefore, among the three indicators of the Overall Goal shown in Table 10, the most relevant indicator for measuring change in the number of patients is "Case notification rate of all forms of TB". As shown in the table, notification rate of all forms of TB was maintained almost at the same level in Yangon and was on a downward trend in Mandalay. It was not “increased up to 2015 and shows a downward trend” as expected.[66] From this result, level of achievement of Overall Goal is evaluated as fair.

4.2.2.2 Other Positive and Negative Impacts

There were no other impacts.

As described in "4.2.1 Effectiveness", the project enhanced the TB control program in various aspects; however, in both Phases 1 and 2, the level of achievement for improving the TB control program in Yangon and Mandalay regions, which was the Project Purpose, was moderate. The number of TB patients in the two regions, which was the Overall Goal, was not changing in the expected manner, i.e. increased up to 2015 and thereafter started decreasing. Therefore, the impact that the project had given to Overall Goal was somewhat limited. Therefore, effectiveness and impact of this component was evaluated as fair.

4.3 Efficiency (Rating：②)

Efficiency was evaluated for the 3 components together. See “3.3 Efficiency”.

4.4 Sustainability (Rating：③)

Among the strengthening of NTP, sustainability of the main effects of the project, such as NEQA for sputum smear microscopy, CBTBC, DSR and sputum smear microscopy at station hospitals, were analyzed as follows.

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[65] Previously, TB control emphasized treating patients who were found to be positive by sputum smear microscopy until they become negative. Although it is still important to find, test and treat the patients who were positive in sputum smear microscopy, in view of the situation that the number of TB patients has not drastically decreased by this activity alone in recent years, it became a mainstream policy that patients who were diagnosed with TB from the findings of chest x-rays or results of tuberculosis bacterium PCR test (these are referred to as "all forms of TB patients") should also be identified, tested and treated without prejudice. Therefore, in recent years WHO does not use the number of new smear positive patients and the case notification rate of new smear positive patients as indicators, and uses the number of all forms of TB patients and its notification rate as indicators of identification of cases.

[66] According to an explanation from the person in charge of NTP, the notification rates in these regions did not dramatically decrease because of the influence of social factors, such as being densely populated, lack of drastic improvement in housing and living conditions, and inflow of labor population, which includes TB patients, to these regions due to the boom in construction.

4.4.1 Policy and Political Commitment for the Sustainability of Project Effects

At the time of the ex-post evaluation, the country has formulated the *National Tuberculosis Strategic Plan (2016-2020)* which has a policy to strengthen and continue control measures in the future, too. It is planned to strengthen and continue control measures; and one of the specific targets in the plan is to reduce the TB prevalence per 100,000 population (all forms of TB) to 348 by 2020. CBTBC, for which the project supported the formulation of guidelines, is positioned as an essential program in the said plan.[67] The measures introduced by the project, such as the sputum smear microscopy by LQAS, CBTBC, DSR, and sputum smear microscopy at station hospitals, have been continued and expanded. It is highly likely that these systems will continue in the future.

4.4.2 Institutional Aspect for the Sustainability of Project Effects

At the time of the ex-post evaluation, NTP is located under the Disease Control Division of the Department of Public Health, Ministry of Health and Sports. This includes the Lower Myanmar TB Center and the Upper Myanmar TB Center in Yangon and Mandalay respectively.

Below that, there are tuberculosis officers in the Health Department at the state /regional level. Below these, there are TB team leaders in each district and TB medical officers at township level, who are engaging in TB control and prevention while working on other diseases at the same time. For TB testing, there is a NEQA management unit for sputum smear microscopy in the National Tuberculosis Reference Laboratory, which is designated under NTP and affiliated with Yangon General Hospital.

Although vacancies for central and regional NTP staff are being filled, the status of fulfillment of technical staff is still low. However, in this project, DSR, CBTBC and other programs were introduced to encourage identification of cases through private partnerships based on the fact that NTP has a staff shortage. At the time of the ex-post evaluation, these programs were implemented by NGOs and others, and there were no institutional problems.

With regard to TB testing, too, the project assisted training of public health service staff so that they can conduct sputum smear microscopy at station hospitals where there is no allocation for a laboratory technician, taking the problem of staff shortage into consideration. At the time of the ex-post evaluation, the tests were being conducted at 70 of the 94 station hospitals in the country (as of 2016). However, out of the five places the project assisted the introduction of the tests, only two hospitals were conducting the testing service at the time of the ex-post evaluation. Testing service in the other three hospitals had been suspended after the trained staff were transferred, and either there was no handing over of the duty to their successors or the staff vacancies were not filled. The National Tuberculosis Reference Laboratory and NTP are aware of this problem and are encouraging townships medical officers who supervise the station hospitals where the testing service was suspended to resume the services.

[67] Source: *National Strategic Plan for Tuberculosis 2016-2020*, NTP, p94

4.4.3 Technical Aspect for the Sustainability of Project Effects

At the time of the ex-post evaluation, NTP continuously monitors and analyzes the results and effects of CBTBC and DSR implemented in the country. NTP incorporates the result at the time of policy development. There is no technical problem in this regard.

Figure 5 shows performance of the NEQA sputum smear microscopy, which was introduced by the project, in all the TB laboratories in the country. The percentage of TB laboratories that produced major errors in NEQA has been on a downward trend, which shows an improvement.

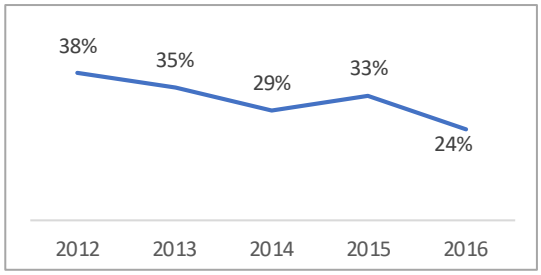


Figure 5 Ratio of TB laboratories that produced major errors in NEQA for sputum smear microscopy among all the laboratories in the country (%)

Source: National TB Reference Laboratory

Even after completion of this project, the National TB Reference Laboratory continues training for staff in charge of TB testing services, and they conducted 4 training programs for newly assigned staff and those already in-service respectively in fiscal year 2017. Because there are transfers and new appointments of persons in charge of the tests, the Laboratory needs to conduct the training regularly and continuously for maintaining and improving the test accuracy. After completion of the project, the Laboratory added the test procedure of the fluorescent dyeing method[68] to the LQAS guideline that was originally prepared with the assistance of the project, and issued it as the second edition.

As described above, NTP and TB laboratories are equipped with the technique necessary to sustain the effects of the project.

4.4.4 Financial Aspect for the Sustainability of Project Effects

The government budget for NTP in 2016/17 was 5,568 million kyat (about 4 million USD). The assistance from international organizations to NTP in 2016 were 25 million USD from GF and 10 million USD from other multilateral and bilateral donor agencies.[69] In recent years, both the government budget and donor assistance had been on an increasing trend. The GF, the largest donor, has committed its assistance to the country until 2020. It seems that there will be no impact on sustainability of the effects of the project, although some reduction of amount will be expected in future. Anti-TB drugs that had been procured with the support of the project and others were procured by the budget of the Ministry of Health and Sports from the financial year 2013, and there was no shortage with the drugs.

For implementation of CBTBC and DSR, funds were also provided by GF at the time of the ex-post evaluation. According to the explanations from NTP officials and MHAA, it is expected

[68] The fluorescent dyeing method is one method for dyeing sputum spread on a glass slide.

[69] Source: Document provided by NTP.

that funds will be provided for the programs from GF in the future, too, although there would be some reduction in amount.

In light of the above, no major problems have been observed in the policy background and the organizational, technical, and financial aspects. Therefore, sustainability of the effects of this component is high.

5. Result of Evaluation of the Malaria Control Component

The project introduced a community-based malaria control program for the purpose of strengthening measures against malaria in the East and West Bago region in Phase 1. During Phase 1 extension period, Magway region and Lakhain state were added to the project area, and the project implemented and expanded the community-based malaria control program by utilizing the supplies and equipment for malaria control procured through Grant Assistance Project. In Phase 2, to strengthen malaria control activities in the areas that are difficult to reach by basic health staff (hard-to-reach areas), the project developed a model whereby villagers implement activities as volunteers. At the terminal evaluation of Phase 2, it was confirmed that the project purpose was achieved; a decrease in the number of malaria deaths, the Overall Goal, has already been realized.

5.1 Relevance (Rating：③)

5.1.1 Consistency with the Development Plan of Myanmar

Control of malaria was regarded as one of the most important national priorities in the National Health Plans of the country during the periods of planning and completion of both Phases 1 and 2, and national programs were carried out. Therefore, the project was consistent with the development policy of the country.

5.1.2 Consistency with the Development Needs of Myanmar

At the time of planning of Phase 1, malaria was the number one cause of death in the country[70], and it was necessary to develop a model for early diagnosis and prompt treatment. At the time of completion of Phase 1 and planning of Phase 2, malaria was in ninth place of cause of death in the country[71], and the need for control measures remained high. Although the situation was improving at the completion of Phase 2, continued prevention and management was necessary to eradicate malaria by the national target of 2030, and the need for assistance was still high. In this way, the content of assistance of the project was consistent with the development needs of the country from planning of Phase 1 to completion of Phase 2.

[70] Source: *Annual Hospital Statistics Report 2004,* Ministry of Health, Myanmar.
[71] Source: *Health in Myanmar 2013*, Ministry of Health, Myanmar (statistics of 2011 and published in 2013).

5.1.3 Consistency with Japan's ODA Policy

See "3.1.3 Consistency with Japan's ODA Policy".

In this way, the contents of assistance of this component were consistent with the development needs of the country throughout the period from planning of Phase 1 to completion of Phase 2.

5.2 Effectiveness and Impact (Rating：③)

5.2.1 Effectiveness

【Phase 1】

In Phase 1, the project developed a community-based malaria control program (see the following column) that carries out comprehensive intervention at each stage of malaria control activities.

The project implemented the package, which includes pull-type goods supply management system[72], microstratification maps using GIS and others, firstly in the pilot area to confirm the effect, and then implemented it in the four states/ regions during the phase 1 extension period by utilizing Grant Assistance, which is described below.

The effect of the package was recognized and was adopted in the control measures and plans of the national policy, facilitated finding of suspected malaria patients and improved patients' access to health facilities, and identifying malaria patients. Early diagnosis and prompt treatment also promoted prevention of infection, and contributed to a reduction in the number of malaria in-patients, serious and complicated cases and the number of malaria deaths.

As shown in Table 11, the Project Purpose was also achieved; and strengthening of NMCP aimed at this project has been realized.

<Community-based malaria control program>

The main contents of the community-based malaria control program introduced in the project are as follows.

(1) Enhancement of malaria control by basic health staff

The station hospitals, where doctors are assigned, were the center of diagnosis and treatment of malaria at the time of starting the project. However, when the project analyzed medical records of the hospitals, it was found that in many cases patients were brought into hospital too late.

Therefore, the project concluded that it was essential for basic health staff, working in Rural Health Centers and Sub-Rural Health Centers that are closer to where villagers live than hospitals, to conduct early diagnosis and prompt treatment of malaria. In order to realize this, the project provided training on malaria control to the basic health staff working at the centers and introduced the pull-type goods supply management system at the centers, so that stocks such as rapid diagnostic

[72] Demand-based goods supply system. While the traditional push system distributes goods to every center, such as Rural Health Centers, uniformly; in this system, staff of the centers request goods to the relevant malaria control office of the TS periodically according to inventory status and needs, and visit the office to receive them.

kits and anti-malaria drugs would not become scarce.

(2) Measures for forest workers

As a result of operational research conducted by the project, many malaria patients in the project target area were found to be adult male forest workers. Therefore, the project provided training programs to forest inspectors in cooperation with the Forest Department of the country; and provided necessary material for malaria control, so that they can provide malaria diagnosis and treatment services to the forest workers.

(3) Promotion of malaria control measures at township level

The project introduced implementation plans and the management system of malaria control to the townships for effective implementation of malaria control measures. For example, it promoted utilization of microstratification maps, which show areas of malaria epidemics in the townships in different colors, so that distribution of inputs, such as mosquito nets and others, is conducted effectively, and information management using databases.

Table 11 Achievement of Project Purpose – malaria Control Component Phase 1

Project Purpose	Indicators	Status of Achievement
NMCP is strengthened.	(1) No of evidence and findings from outputs utilized to improve NMCP. [Achieved]	Community-based malaria control program introduced by the project was utilized in national level policies and guidelines. For example, the pull-type goods supply management system was adopted as a "Standard Operation Procedure Manual on Drug Supply management for National Malaria Control Program". Microstratification maps were firstly adopted by the United Nations Children's Fund (UNICEF) and then adopted by the national program *Myanmar National Malaria Prevention Strategic Plan 2010 - 2016*. These programs were utilized nationwide for improving NMCP.
	(2) Malaria morbidity and mortality in project site. [Improved and achieved]	The number of malaria patients decreased after the peak of 2009 in East and West Bago regions, where the project carried out interventions intensively (Figure 6). This shows that the number of patients increased because detection of patients was promoted by implementation of the community-based malaria control program, and thereafter the number decreased as a result of the effect of interventions for prevention of infection. The number of patients in Rakhine state and Magway Region, added as the project target area since the Phase 1 extension period, has been almost flat (Figure 7). This suggests that detection of malaria patients and infection prevention were progressing in parallel. The number of malaria deaths decreased remarkably in all state/regions. This shows the effect of early diagnosis, prompt treatment, and infection prevention. (Figure 8).

Project Purpose	Indicators	Status of Achievement

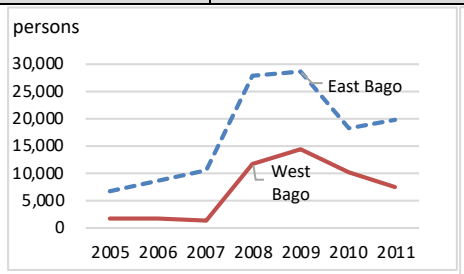


Figure 6 No. of Malaria Patients (East and West Bago Regions)

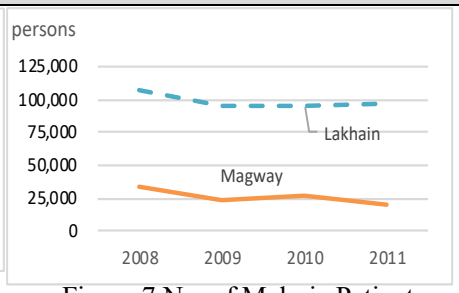


Figure 7 No. of Malaria Patients (Magway Region and Lakhain State)

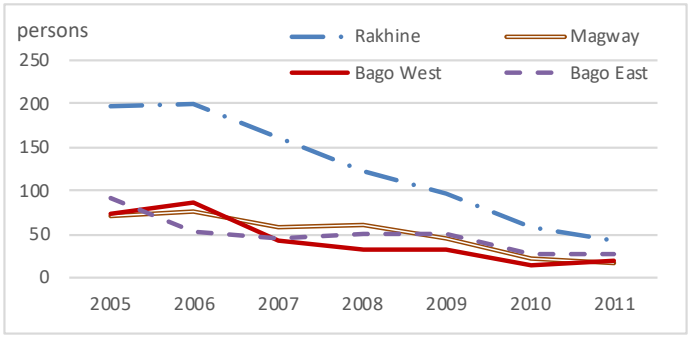


Figure 8 No. of Malaria Deaths

<Collaboration with Grant Aid Project>

During implementation of Phase 1, a Grant Aid Project "The Project for Malaria Control in Myanmar" was implemented in the four target areas in 2008, and malaria rapid diagnostic kits, anti-malaria drugs, mosquito nets, insecticide, etc. were procured. At that time, the supply of malaria control goods was insufficient due to the influence of suspension of assistance from GF. Therefore, the procurement carried out by the grant assistance project was important. These supplies and equipment were distributed, managed, and monitored by the pull system and databases introduced by the project, and were effectively utilized for control activities. In addition to this, the project assisted effective utilization of goods and equipment procured through the projects of Grant Assistance for Grassroots Human Security, which were proposed by the malaria control teams in the target area. In this way, effective implementation of the grant assistance projects[73], which fully utilized the outcome of the project, contributed to the achievement of the Project Purpose of the project.

[73] The Ministry of Foreign Affairs of Japan implemented a total of 6 projects of Grant Assistance for Grassroots Human Security on malaria control and hospital facility improvement in the target area of the project from 2005 to 2013.

Figure 9 Rapid Diagnosis Kits and Anti-malaria Drugs Procured for Malaria Control by the Grant Aid Project

Source: *Report of Malaria Control Plan*

【Phase 2】

In Phase 1, the project introduced and expanded the community-based malaria control program conducted by the basic health staff. In Phase 2, the project developed this program and introduced a system for village volunteers to carry out malaria control activities in areas where it is difficult for the basic health staff to reach, and the threat of Artemisinin-resistant malaria is high. The project confirmed the effectiveness of the malarial control activity by village health volunteers (hereinafter referred to as "CHW"[74]) in the pilot area, then gradually expanded the activity area, and at the completion of Phase 2 the project implemented malaria control by CHW in eleven townships in Bago regions as planned.

In addition, report preparation and data analysis using microstratification maps were conducted nationwide, four types of databases for improvement of monitoring, reporting and management were developed and used, and the program management capacity of NMCP was enhanced nationwide. These outcomes were shared and used with development partners. As shown in Table 12, the indicator of Project Purpose was achieved, too.

Table 12 Achievement of Project Purpose – Malaria Control Component Phase 2

Project Purpose	Indicator	Status of Achievement
Implementation/ monitoring capability of NMCP are strengthened in the project area.	Full-scale implementation of community-based malaria control program in hard-to-reach areas developed by the Project has commenced. [Achieved]	Malaria control activities by CHW, including identifying cases, diagnosis, treatment and monitoring of malaria patients, and the pull-type goods supply management were implemented in the hard-to-reach areas. At the time of project completion, full-scale implementation of the community-based malaria control program had been started in hard-to-reach areas, as planned. In addition, VBDC's management and monitoring capacity of malaria-control activities had been improved by utilizing CHW training

[74] At the time of ex-post evaluation, NMCP also calls CHW as VHW (Village Health Workers), However, CHW, which was used during the implementation of the project, is used in this report.

Project Purpose	Indicator	Status of Achievement
		tools, inventory management and epidemiological information report formats, and various databases developed by the project.

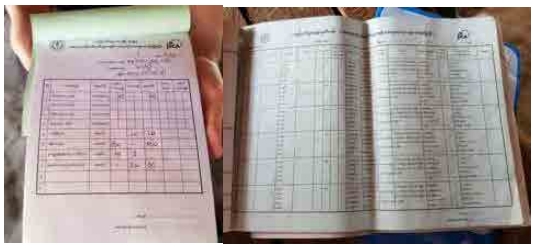
<Malaria Control by CHW>

It was in 2012 that villagers re-settled in Pao (HpaO) village in the East Bago region. At that time the road to the village had not been built, and when the villagers were sick they either had to spend a whole day walking to a pharmacy in the nearest town to buy medicine, or be treated with medicinal herbs. The villagers did not go to hospital because they were not familiar with the hospitals and had a strong sense of resistance. However, there were malaria deaths near the village, and malaria was a threat to the villagers.

In 2013, a village woman participated in a malaria control training of this project and started working as a volunteer. Since the volunteer was able to diagnose and treat, the villagers contacted the volunteer when they had a fever, received a rapid test for malaria and got medicine on the spot if it was positive. They also learned the importance of using mosquito nets and early diagnosis, and getting prompt treatment through volunteers.

Such prevention, early diagnosis and prompt treatment have been successful, and there has been no case of malaria in the village in recent years. However, the volunteer continues preventive and diagnostic activities, and was careful about symptom of re-establishment of malaria. She mentioned that she would like to continue the activities in the future, too, because the villagers appreciate her work, and it is only a small amount of extra work that can be done while looking after a house and bringing up children, and she enjoys doing this work.

The malaria volunteer in Pao village (left)



The drug inventory management book (left) and patient record book (right) maintained by the volunteer

5.2.2 Impact

The program for finding and treating malaria patients by CHW was conducted in most of the hard-to-reach areas throughout the country at the time of the ex-post evaluation. There were around 9,000 CHW. The databases developed in the project were utilized in the townships nationwide where the CHW program is implemented. NMCP improved the formats of the databases after project completion, so that they can input data more accurately and conduct more complicated analysis.

All the townships were developing microstratification maps using GIS for analyzing priority area for input. The pull-system distribution and management of supplies for malaria control, which was introduced by the project, was also continuing throughout the country. In this

way, the outcome of the project was continuing even after project completion, and contributing to achievement of the Overall Goal.

5.2.2.1 Achievement of Overall Goal

As shown in Table 13, the number of malaria patients who were diagnosed and treated at health facilities increased as a result of usage of the facilities being promoted, and thereafter turned to a decrease as a result of progress with prevention of infection. The number of malaria inpatients, serious and complicated patients, and malaria deaths were continuously decreasing nationwide. These were the result of strengthening the malaria control program of NMCP. Therefore, the Overall Goal was achieved.

Table 13 Status of Achievement of Overall Goals – Malaria control component Phases 1 and 2

Overall Goals	Indicators	Status at the time of the ex-post evaluation
【Phase 1】 Malaria control is strengthened beyond the project sites due to increasing utilization of health services.	(1) No. of malaria patients diagnosed and treated at health facilities shows upward trend [Achieved]	Number of malaria patients (outpatient + inpatient), who were diagnosed and treated at health facilities in the country increased as a result of identifying cases at the time of Phase 1 (from 2004 to 2010); however, it continued to decrease from 2012 onwards.
	(2) No. of malaria in-patients, severe and complicated cases and malaria deaths is reduced. [Achieved]	The number of malaria inpatients, serious and complicated patients, and malaria deaths were continuously decreasing in the country.
【Phase 2】 NMCP is strengthened.	(1) No. of malaria patients examined and treated at health facilities shows upwards trend. [Achieved]	See the description of indicator (1) of Phase 1. At the time of the start of Phase 2, it was expected that the number of patients who were diagnosed and treated would increase as a result of improved access to health facilities. However, the numbers turned to decreasing from 2012 onwards, as a result of prevention of infection being promoted more than expected.
	(2) Declining trend in number of malaria deaths continues. [Achieved]	See the description of indicator (2) of Phase 1.

5.2.2.2 Other Positive and Negative Impacts

Learning from malaria control, NAP and NTP adopted analysis using GIS mapping. Thereafter, the technique was used for enhancement of these programs. This was a result that the local staff of the JICA expert team for malaria control conducted training for local staff in NAP and NTP.

As a result of implementation of the project, strengthening of NMCP, which was set as Project Purpose, was realized. The decrease in the number of malaria inpatients, serious and complicated

patients, and malaria deaths, which is the Overall Goal, was also realized. In this manner, the expected effect was created, and therefore, effectiveness and impact of this component are high.

5.3 Efficiency (Rating：②)

Efficiency was evaluated for the 3 components together. See "3.3 Efficiency".

5.4 Sustainability (Rating：③)

Among the measures for strengthening of NMCP, sustainability of the main effects of the project, such as community-based malaria control program by basic health staff and CHW, analysis by microstratification maps using GIS, distribution and management of supplies for malaria control by the pull system, were analyzed as follows:

5.4.1 Policy and Political Commitment for the Sustainability of Project Effects

The country's strategic plan for malaria control at the time of the ex-post evaluation has a policy for further enhancing malaria control with the aim of eradicating malaria by 2030 and reducing the incidence of malaria to less than 1 case per thousand population at risk[75] in all states/ regions by 2020. This policy is facilitating sustainability of the effect of the project.

The community-based malaria control program by basic health staff and CHW, distribution and management of supplies for malaria control by the pull system, usage of the databases for volunteers and patients and analysis by microstratification maps using GIS, were conducted at the time of ex-post evaluation. It is highly likely these programs will continue in the future, too, since they were established as a system.

5.4.2 Institutional Aspect for the Sustainability of Project Effects

VBDC is located under the Disease Control Division, Department of Public Health in the Ministry of Health and Sports. The deputy director in charge of malaria, who is responsible for VBDC, is also responsible for NMCP.

The central VBDC office is in charge of planning, monitoring, management, and human resource development for control of vector-borne infectious diseases including malaria and others. The regional/ state VBDC teams are facilitating implementation of malaria control programs, supply of goods and technical support to townships. Staff of townships, Rural Health Centers, and Sub Health Centers and CHW are implementing prevention, diagnosis and treatment of malaria.

There are staff shortages in both central and regional offices. However, there was no problem of discontinuation of activities and systems introduced by the project due to staff shortages. This is because the project established a system for basic health staff and CHW to engage in prevention and treatment, so that they can be conducted in spite of staff shortages.

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[75] "*National Plan for Malaria Elimination in Myanmar*" identified the population at risk in each stratum according to the result of micro-stratification analysis. Source: *National Plan for Malaria Elimination in Myanmar 2016 – 2030,* NMCP (p5, Table 1).

5.4.3 Technical Aspects for the Sustainability of Project Effects

The project did not introduce advanced techniques, but introduced those acquirable and continuable even by health staff working in peripheral areas. NMCP continues training programs for usage of databases and others for basic health staff and CHW. NMCP continues to plan, monitor, and implement the malaria control program, and carried out improvements of these when necessary even after the project completion. There is no problem in their technical capabilities.

Therefore, concerning various systems introduced in this project, problems such as delay in implementation and continuity due to technical problems have not occurred.

5.4.4 Financial Aspect for the Sustainability of Project Effects

The government budget for VBDC in 2016/17 was 185 million kyat (around 130 thousand USD), and the assistance from international organizations to NMCP in 2016 was 55 million USD from GF and 16 million USD from other multilateral and bilateral donor agencies[76]. In recent years, both the government budget and donor assistance had been on an increasing trend. The GF, the largest donor, has committed its assistance to the country until 2020. It seems that there will be no impact on sustainability of the effects of the project, although some reduction of amount will be expected in the future.

Anti-malaria drugs, rapid diagnostic kits, mosquito nets, insecticides, etc., which had been procured with support from the project and the Grant Assistance Projects are procured with the budget of the Ministry of Health and Sports and GF; there were no problems for activities for prevention and treatment. There has been no problem due to financial issues, such as interruption or discontinuation, with regard to the various systems introduced by the project.

No major problems have been observed in the policy background and the organizational, technical and financial aspects. Therefore, sustainability of the effect of this component is high.

＜Role and Contribution of JICA＞

JICA formulated and started assisting the project, which was urgent and necessary in humanitarian aspects, under circumstances whereby overseas assistance to Myanmar was limited.

The project was implemented in a highly effective and sustainable manner, continuing the assistance seamlessly in responding to political changes in the country, such as the general election and changes of government; assisting operational research necessary for improvement of national programs; introducing and expanding the models for controlling infectious diseases based on the results of the research; developing various guidelines; and nationwide expansion and establishment of the various programs through technical training programs. Behind this achievement, there was a great contribution by experts and other stakeholders of JICA working for the project, including harmonious communication with the implementing agency; appropriate judgment corresponding to changes in the local environment; accurate analysis of problems and needs; and strong commitment to improvement.

[76] Source: Document provided by VBDC.

6. Overall Evaluation Result of the Project (Rating: A[77])

Relevance is high for all three components. Effectiveness and impact are high for HIV/AIDS and malaria components, and fair for the TB component. Therefore, effectiveness and impact of the project as a whole are high. Efficiency is evaluated for the three components together and is fair. Sustainability is high for all three components. In light of the above, this project is evaluated to be highly satisfactory.

7. Conclusion, Lessons Learned and Recommendations

7.1 Conclusion

This project supported control measures against major infectious diseases such as HIV/AIDS, TB and malaria in Myanmar.

Throughout the project implementation period, HIV/AIDS, tuberculosis and malaria control were priority issues of the country, and the need to strengthen measures for the control was high; the project was consistent with Myanmar's development policies and development needs. Implementation of the project was urgent and duly consistent with Japan's ODA assistance policy to the country, which was promoting assistance for truly humanitarian needs. Therefore, the relevance of this project is high.

With regard to the HIV/AIDS control component, the project engaged mainly in preventing HIV infection from donated blood, expanding external quality control of HIV and syphilis tests, and improving data management capability; these were among the measures for capacity enhancement of the NAP, which was the Project Purpose of the component and created expected outputs at large. The HIV prevalence of donated blood, which was one of the indicators of Overall Goal, was maintained at the expected level, and the prevalence of HIV among the adult population showed a decreasing trend. From this, effectiveness and impact are evaluated as high. There is no problem in sustaining the effects of the project in political, institutional, technical, and financial aspects; therefore, its sustainability is high.

With regard to the TB control component, the project engaged in strengthening TB control in various aspects. However, the level of achievement of the Project Purpose, improvement of TB control measures in Yangon and Mandalay Regions, was moderate in both Phases 1 and 2 of the project. The decrease in the number of TB patients in both regions, which was the Overall Goal of the project, was not realized in the expected manner. Therefore, effectiveness and impact of the component was evaluated as fair. There is no problem in sustaining the effects of the project in political, institutional, technical and financial aspects; therefore, its sustainability is high.

With regard to the malaria control component, strengthening the NMCP, which was the Project Purpose, was realized. Reduction of numbers of malaria in-patients, serious and complicated patients, and malaria deaths, which were the Overall Goal, was realized. The effectiveness and impact of the component is evaluated as high because the planned effect was realized in this

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

manner. There is no problem in sustaining the effects of the project in political, institutional, technical, and financial aspects; therefore, its sustainability is high.

Efficiency was evaluated for the three components together. Although the project period was as planned, the project cost exceeded the plan. Therefore, efficiency of the project is fair.

From the above results, this project was evaluated as “highly satisfactory”.

7.2 Recommendations

7.2.1 Recommendations to the Implementing Agency

7.2.1.1 <HIV/AIDS Control Component> Further improvement of blood safety by enhancing institutions for blood transfusion service (Ministry of Health and Sports)

The computerized blood donor registration system was introduced by the project at 34 locations throughout the country. At the time of ex-post evaluation, NBC and the BTUs of Mandalay General Hospital utilize the system, screening volunteer blood donors by checking their past records of donation in the system when they visit the center. NBC also utilizes the database built in the system to identify those who provided safe blood in the past; and also, regularly contact them to encourage blood donation.

These are important efforts to further improve the safety of donated blood. On the other hand, 32 other BTUs only use the system for summarizing data and reporting at the time of ex-post evaluation as described in this report. The main reason for this is that there are no dedicated staff for blood transfusion service at these centers. To further improve blood safety, it is important to enhance screening and secure safe volunteer donors using the computerized blood donor registration system introduced by the project. Therefore, it is recommended that the Ministry of Health and Sports actively consider enhancing institutions for blood transfusion services, such as assigning dedicated staff at major BTUs.

7.2.1.2 <HIV/AIDS Control Component> Improvement of accuracy of syphilis test by regular and more frequent technical guidance (Ministry of Health and Sports)

As mentioned in this report, there was no stable improvement in the percentage of laboratories that did not reach the target score in NEQA for syphilis testing. This is mainly due to insufficient technical guidance to laboratories newly joining NEQA and newly-appointed laboratory technicians. NHL is aware of the need to improve the accuracy of the tests, including syphilis. However, due to budget constraints, training for in-service staff can be conducted about twice a year, and monitoring visits can be conducted once a year or two years. NHL believes that this should be done at least four times a year and twice a year, respectively.

Improving test accuracy is important for infection prevention and treatment, too. Regular and more frequent training and monitoring visits should be conducted in order to improve the accuracy of the tests, because laboratory technicians in laboratories across the country are often replaced due to relocation or change in career. Therefore, the Ministry of Health and Sports is recommended to make necessary budget allocation for this.

7.2.1.3 <TB Control Component> Secure placement of staff in-charge of sputum smear microscopy at station hospitals and technology transfer (NTP)

Based on the lack of laboratory technicians, the project supported training for public health service staff working at station hospitals, and made sputum smear microscopy available at health facilities closer to the local residents. In the ex-post evaluation, it was confirmed that the test system has been continued and expanded, contributing to finding TB cases. However, some medical facilities did not continue the tests, because of staff shortages and insufficient handing-over of the duty. NTP is recommended to facilitate more positively medical officers working at hospitals where the test is not functioning, and township medical officers to which the hospitals belong, so that they can re-establish the function by appointing staff in-charge of the test and give them opportunities to participate in the training for new staff.

7.2.2 Recommendation to JICA

None.

7.3 Lessons Learned

The program introduced by the project was disseminated nationwide as a result of showing its versatility and incorporating it in policies and systems.

In the malaria control component of this project, based on the fact that there were many malaria deaths, and in many cases, it was too late when patients were brought in hospitals, the project implemented the community-based malaria control program by health staff working at peripheral heath institutions in order to speedily and reliably deliver preventive, diagnostic and treatment services to patients firstly in the pilot area, and showed its effectiveness. The project then implemented the program in other areas, and showed the Myanmar government and other development partners, that the program can be widely used in actual field operations, not only under the special environment of the pilot area.

Furthermore, the project positively shared information on the result of the program implementation and its effectiveness with the Myanmar government and other development partners, through presentations at seminars and distribution of reports, aiming at nationwide dissemination of the program. As a result, these institutions recognized effectiveness of the program and incorporated the program in their policies and systems, and then, the program became expansively implemented nationwide. The program was integrated as a part of policies and systems of malaria control of the country, and was implemented nationwide at the time of the ex-post evaluation, too.

When a project aims at geographical expansion of a program developed in pilot areas, it is important to show its versatility by implementing it in areas other than the pilot areas. In addition, if the project aims at nationwide expansion of the program, it is useful to positively share the result of the program implementation and its effectiveness with the implementing agency of the project and other development partners, let them recognize effect of the program, and encourage them to incorporate it to their policies and systems.

Status of Achievement of Outputs

HIV/AIDS Control Component

【Phase 1】[78]

Output 1: Blood safety for HIV and TTI is enhanced.

Indicators [Status of Achievement]	Status as of Terminal Evaluation or Completion of the Project
1.1 Number of blood centers adopting blood donor deferral. [Increased]	The number of BTUs that introduced donor screening system increased every year and reached 160 locations in 2011. This was about 40% of all 422 BTUs in the country at the time of completion
1.2 The development of SOP. [Developed, approved, and distributed]	An SOP (Standard Implementation Procedure) for blood safety was completed in 2011, approved by the Ministry of Health and Sports, and 1,000 copies were printed. It was distributed all over the country to medical institutions that were carrying out blood transfusion services.
1.3 Number of training sessions and trainees. [Conducted continuously]	Training on blood donor screening was conducted continuously. For example, during the extension period a training module based on SOP was developed, and training of trainers (TOT) was conducted for pathologists and doctors at 22 hospitals in 16 state/ regions; 58 people participated. After that, the TOT participants conducted a total of 10 training sessions.
1.4 Number of reporting transfusion services. [Improving]	Comparing the test results of HIV prevalence of donated blood among the NEQA participating laboratories in 2010 and 2011, the number of laboratories that were "accurate and regular" increased from 21 to 28, and "not submitted /inaccurate but irregular" decreased from 65 to 32. Therefore, it was improving.
1.5 Number of meetings [Conducted periodically]	Meetings with stakeholders on blood safety, such as pathologists working for hospitals and NBC staff, were regularly carried out. The following meetings are examples of those held during the extension period: July 2010: 28 people participated from 28 hospitals in 14 state/ regions February 2011: 32 people participated from 29 hospitals in 14 state/ regions
1.6 Productions for TV spot [Achieved]	Two TV spots were created and aired. In addition, many leaflets, videos, brochures, calendars, posters, etc. were created and distributed.

Output 2 Quality Assurance of HIV tests and other TTIs are improved.

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 Number of laboratories under external quality assurance programme [Achieved]	According to the recommendation of the mid-term evaluation, NEQA expanded to include at least 30 or more numbers of institutions every year. In 2011, 328 out of 422 laboratories across the country were participating in NEQA (78% coverage).
2.2 Number and quality of supervisory visits. [Conducted periodically and effectively]	106 laboratories received monitoring visits. Many laboratories improved their performance as a result of monitoring. Therefore, the monitoring visits were effective. Refresher training and additional monitoring visits were carried out to laboratories that were considered to have problems.
2.3. Number of training sessions and trainers [Conducted continuously and in accordance with the guidelines]	NHL continuously conducted training for NEQA for laboratory technicians. For example, training sessions were conducted in August 2005 (66 participants), July 2006 (69), July 2007 (31), March 2009 (20), September 2010 (for 32 laboratories in 31 hospitals).

[78] In this "Status of Achievement of Outputs", unless otherwise noted, the sources of the status of achievement are the terminal evaluation reports and project completion report of this project. Level of achievement could not be measured for some indicators for which target values were not specified. These indicators were considered to have met the target if the results showed continuation, expansion and improvement of activities and status, and were considered to have contributed to the achievement of the Outputs.

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.4 Number of copies of guideline distributed. [Developed, approved, distributed, and used]	NEQA guidelines for HIV testing were developed, approved by the Ministry of Health, printed in 1,000 copies, distributed to all hospitals, AIDS/ STD teams, international NGOs, and international organizations participating in NEQA. 300 or more numbers of hospitals were using the guidelines at the time of the terminal evaluation. The NEQAS guidelines for syphilis testing were also completed, printed, and distributed to laboratories nationwide before completion of the project.

Output 3 Capacity of National AIDS Program is strengthened.

Indicators	Status as of Terminal Evaluation or Completion of the Project
3.1 Cases of improved routine work and performance. [There were such cases]	Examples of improved routine work include the national annual review meetings, the annual review meetings of this project, the HIV testing kit coordination meetings, the technical and strategy group meetings[79], and the exhibition of this project at the World AIDS Day ceremony.
3.2 Number of training sessions and trainees. [Conducted continuously]	Training sessions for NAP staff were carried out continuously. The major training program conducted before the extension period were the induction training course (two times and 29 participants), and a team leader training in Thailand (3 times and 46 participants). The major training program after the extension includes the induction training course (once and 15 participants), data management training course (once and 41 participants), and STI syndromic management training course (2 times and 116 trainees). Four people from the AIDS teams and two staff of the Ministry of Health participated in the management capacity building training at Mahidol University in Thailand.
3.3 Number of proposed projects [13 were proposed and one was approved]	A total of 13 small projects for HIV/AIDS care were proposed by the AIDS / STD team, one of which was approved by the Ministry of Health and implemented.
3.4 Number of M&E visits [Conducted]	During the extension period, M & E officers conducted inspections in the Ayeyarwady and Sagaing regions.
3.5 Number of TV spots on-air [2 times]	Two TV spots were aired.

【Phase 2】

Output 1 Safe blood donation is enhanced.

Indicators	Status as of Terminal Evaluation or Completion of the Project
1.1 Number of BT units adopting SOP on blood safety guidelines will increase from 160 in 2011 to 280 in 2015. [Achieved]	Upon completion, 304 BTUs had adopted the SOP for HIV testing; this number exceeded the target.

Output 2 Quality of screening of HIV and syphilis is ensured

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 Number of laboratories under NEQAS. [Achieved]	Upon completion, 366 laboratories participated in NEQA for HIV testing. The NEQA for syphilis testing started in 2012; at the time of completion 71 laboratories participated in the NEQA. At that time, there were 422 BTUs in the country. The laboratories participating in NEQA for both HIV and syphilis covered the whole country geographically.
2.2 False results of screening test (false	Note: PDM 2nd version mentioned 5% to 10% as an example of a low level.

[79] Technical and Strategy Group - a group set up to discuss technical and strategic matters for each disease in the country.

Indicators	Status as of Terminal Evaluation or Completion of the Project
positive or negative rates) of NEQAS on HIV and syphilis will be maintained at low level. [Partly achieved]	The percentage of laboratories produced errors in HIV testing was maintained at a low level (10% or below) from 2011 to 2014, and 7.9% at completion. The percentage of laboratories produced errors for the qualitative test in syphilis testing was maintained at the low level of 7% from the latter half of 2013 to 2014. However, for the quantitative test there was a variation in percentages, and even in 2014 it was 24% to 28% and did not reach a low level.

Output 3 Capacity of data management and analysis on HIV/AIDS control activities is improved.

Indicators	Status as of Terminal Evaluation or Completion of the Project
3.1 Annual reports on blood safety for HIV control are published. [Achieved]	A system has been established for NBC to manage nationwide data on blood safety, and the 2012, 2013 and 2014 editions of the *"Blood Safety Annual Report*" were published.
3.2 Annual reports which compile data of testing quality assurance on HIV and syphilis are published. [Achieved]	NHL published the annual report "NEQA system on HIV and syphilis test", which summarized data on HIV and syphilis NEQA in 2012 and 2014. At the time of the ex-post evaluation it was confirmed that, in addition to the annual report, NHL prints reports on the results of every NEQA conducted twice a year, and sends these to all participating laboratories as feedback.

Tuberculosis Control Component

【Phase 1】

Output 1 Capacity for program management and epidemiological data management for TB control is strengthened at central level.

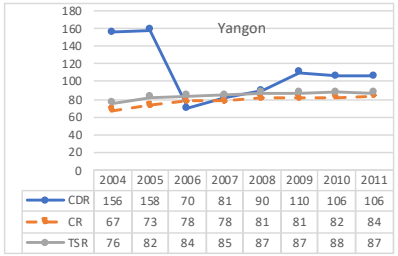
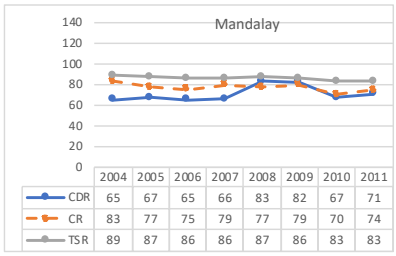
Indicators	Status as of Terminal Evaluation or Completion of the Project
1.1 Results of National Prevalence Survey are authorized by MOH and international organizations and published. [Achieved]	The national tuberculosis prevalence survey conducted by JICA, NTP, WHO, GF and JATA was conducted from 2009 to 2010. The results were approved and published by the Ministry of Health and international organizations.
1.2 NTP activities are presented at international conferences at least once a year. [Partly achieved]	NTP staff presented the results of operational research at the 41st Conference of International Union Against Tuberculosis and Lung Disease Asia Pacific Region held in Berlin in November 2010. There was no record of whether it was presented once a year.

Output 2 TB laboratory services are improved

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 No of skilled laboratory technicians [Increased]	In-service training and monitoring visits were conducted on LQAS and NEQA of TB testing. The number of trained laboratory technicians increased from 184 (2009) to 237 (2010) and 253 (2011).
2.2 % of microscopy centers with major errors [Achieved]	The percentage of laboratories that made major errors was 56.9% (2010) and 55.7% (2011) in Yangon, and 55.4% (2010) and 43.4% (2011) in Mandalay. It was improving in both regions.
2.3 No of TB suspects in selected areas increases compared to the number in 2009. [Achieved]	The number of suspected TB cases increased from 2009 to 2011 as shown in the table below. (Source: Document provided by NTP at the time of the ex-post evaluation)

	2009	2010	2011
Yangon Region (persons)	38,582	40,503	45,264
Mandalay Region (persons)	16,790	18,200	26,666

Output 3 Capacity for TB control is strengthened in Yangon and Mandalay Divisions in accordance with Stop TB strategy.

Indicators	Status as of Terminal Evaluation or Completion of the Project
3.1 Performance indicators are maintained at 2009 indicators (CDR, CR&TSR). [Achieved] (Reference) CDR> 70% and CR> 85% was the target of Project Purpose. The international target value of TSR set by WHO was 85%.	TB performance indicators were maintained at a nearly constant level as shown in the tables below. However, the number of estimated TB patients, which is the denominator of CDR, has changed several times as a result of the national TB prevalence survey and others. Therefore, it is difficult to evaluate yearly changes. Performance indicators (Unit: %)[80]  2004 2005 2006 2007 2008 2009 2010 2011 CDR 156 158 70 81 90 110 106 106 CR 67 73 78 78 81 81 82 84 TSR 76 82 84 85 87 87 88 87  2004 2005 2006 2007 2008 2009 2010 2011 CDR 65 67 65 66 83 82 67 71 CR 83 77 75 79 77 79 70 74 TSR 89 87 86 86 87 86 83 83
3.2 No of training sessions and quality evaluation in CXR [Conducted. Level of achievement is not known]	In July 2010, the project evaluated the quality of 3,110 TB chest X-ray examination films. In addition, in January 2011 the project conducted training sessions on X-ray film interpretation for 33 laboratory staff. Since the target value has not been set, the achievement level of the indicator is unknown.
3.3 No of cross-referrals between TB and HIV [Conducted. Level of achievement is not known]	According to NTP's explanation at the time of the ex-post evaluation, cross-referral was implemented during the project period; however, there was no information on the number referred. Therefore, the degree of achievement of the indicator is unknown.
3.4 No of family contacts screened, and patients detected [Conducted. Level of achievement is not known]	To screen and find TB patients among family members who have contact with TB patients at home, the project conducted home visits and carried out sputum collection activities in Yangon and Mandalay regions. 112 sputum examinations were conducted; of these, 1 person was positive. Since the target value has not been set, the achievement level of the indicator is unknown.

Output 4 Public Private Partnership is enhanced.

Indicators	Status as of Terminal Evaluation or Completion of the Project
4.1 No of partners' meetings held regularly at each level. [Conducted. Level of achievement is not known]	In order to strengthen PPP at the state/ region and township levels, meetings on PPP were held with the participation of 282 people from six locations from August 2010 to February 2011. According to a document provided by NTP at the time of the ex-post evaluation, the number of suspected TB patients and the number of TB patients referred in the target area of the project increased from 2008 to 2011. Therefore, this indicates that PPP was promoted.

Output 5 Communication and advocacy for TB control is promoted.

Indicators	Status as of Terminal Evaluation or Completion of the Project
5.1 No of IEC materials produced/ reprinted and	Many textbooks, pamphlets, DVDs, posters, T-shirts, hats, etc. were created and distributed to medical staff and patients of TB to create awareness on the importance

[80] Source: Document provided by NTP at the time of the ex-post evaluation. Note) The following points should be noted regarding the actual figure of CDR. (a) The CDR of Yangon in 2004 and 2005 exceeds 100%. This was because the estimated number of TB patients up to 2005 was too low. (b) The CDR of Yangon declined in 2006 because the estimated number of TB patients in Yangon was revised in 2006. (c) The CDR of Mandalay decreased dramatically in 2010, because the estimated number of TB patients in Mandalay was revised and increased in the same year.

Indicators	Status as of Terminal Evaluation or Completion of the Project
distributed for World TB day and other TB control activities. [Conducted. Level of achievement is not known]	and necessity of TB control. They were distributed on World Tuberculosis Days and at other TB control activities. It is difficult to identify total number of copies and kinds of materials distributed, as there were many. A TV spot to create awareness was also aired.
5.2 No of journalists who attended advocacy meetings [Unknown]	A journalist was scheduled to attend the meeting held in the second half of 2011. It is not known whether they attended as there is no information.

【Phase 2】

Output 1　Capacity for program management and data management for TB control is strengthened. 。

Indicators	Status as of Terminal Evaluation or Completion of the Project
1.1 10 Townships utilizing developed guidelines of either CBTBC or drug sellers' referral to expand the related activities. [Achieved to a medium extent]	NTP created training guidelines for CBTBC utilizing the results of operational research on CBTBC conducted by the project. These guidelines were explained and distributed to implementation agencies such as NGOs as guidelines for future CBTBC activities. DSR guidelines were also developed. It is not known whether these guidelines were utilized to expand activities during the project implementation period because there are no records.
1.2 90% of laboratories with no major errors on a quarterly basis[81] through utilizing EQA annual report in Yangon and Mandalay Regions. [Achieved to a large extent]	The percentage of laboratories that did not make major errors in TB NEQA on a quarterly basis exceeded 90% in Yangon from the second quarter of 2013 until the third quarter of 2014. In Mandalay, it was 84% in the third quarter of 2014, but improved and was 90% or more in the first and second quarter of 2014. NTP published the Tuberculosis NEQA Annual Report in 2013; this resulted from analysis of test results collected from the whole country. This preparatory work for the annual report helped to improve NTP's program data management, analysis, and evaluation capabilities.

Output 2 Capacity for TB control is strengthened in Yangon and Mandalay Regions in accordance with Stop TB Strategy.

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 90% of laboratories with no major errors on a quarterly basis through utilizing EQA annual report in Station Hospitals. [Achieved]	The NEQA results from all five station hospitals that received project assistance to open a TB test laboratory were without major errors on a quarterly basis at the time of terminal evaluation (second quarter of 2014).
2.2 Examination of suspected TB cases by drug sellers' reference in the project area is increased by 10%.[82] [Partly achieved]	The number of suspected TB patients referred by drug stores continued increasing in one of the 5 townships that carried out DSR in this project; however, a large number of patients were referred at the beginning of introduction of DSR, and then the number decreased in the other 4 townships. Over the years, many patients did not visit TS hospitals in these four TS - these were referred to the hospitals as soon as DSR was introduced.
2.3 Examination of suspected TB cases by community volunteers' reference in the project	Among the 2 townships in which CBTBC was conducted in this project, the number of suspected TB cases in Pyinmana township nearly doubled in the second year compared to the first year, which was immediately after introduction of CBTBC. The number of TB suspects in Hling township increased in the first year but decreased

[81] "On a quarterly basis" means the proportion of laboratories without major errors in NEQA conducted every quarter (not the percentage of laboratories without major errors throughout the year). This is the same for indicator 2.1.

[82] The aim of this indicator seems to be to increase the number of suspected TB cases referred by drug stores by 10% every year.

Indicators	Status as of Terminal Evaluation or Completion of the Project
area is increased by 5%. [Partly achieved]	thereafter. An officer in-charge of TB control was assigned to Pyinmana township, and the local government also became involved in activities. It was considered that the enhancement of institutional arrangements for supporting CBTBC facilitated increasing numbers.
2.4 Case detection by drug sellers in the project areas is increased by 5% [Partly achieved]	With regard to detection of cases by DSR, there was a similar trend to the number of suspected TB cases mentioned in 2.2. The number of patients detected continued to increase in one of the 5 townships in which DSR was implemented; however, in other townships many patients were detected at the start of DSR, and then the number decreased. This is because patients are found among the suspected cases, and therefore the increase and decrease of the two have been almost proportional.
2.5 Case detection by community volunteers in the project area is increased by 5% [Partly achieved]	Regarding case detection by CBTBC, there was a trend similar to the number of suspected TB cases mentioned in 2.3. One of the 2 townships showed a 14% increase over the previous year, while in the other many patients were detected at the start of CBTBC, then the number decreased. This is because patients are found among the suspected cases, and the increase and decrease of these two have been almost proportional.

Malaria Control Component

【Phase 1】

Output 1 Capacity of health personnel on malaria control (reporting, supply, planning and epidemiological analysis) at Division/ State, T/S levels is strengthened.

Indicators	Status as of Terminal Evaluation or Completion of the Project
1.1 Percentage of townships submitting monthly report regularly to State and Division. [Achieved]	All townships within the project target area submitted monthly reports to the VBDC official in the states/ regions regularly. (100%).
1.2 Percentage of health facilities submitting monthly report to townships. [Achieved]	All health centers in the project target area submitted monthly reports to the township VBDC officer. (100%) regularly.
1.3 Percentage of priority (targeted) townships submitting malaria control micro plans. [Achieved]	At the time of planning, it was expected that 14 townships in East and West Bago regions would submit malaria control micro-plans. The external evaluator learned from NMCP that all townships had submitted micro-plans to the VBDC official in Bago regions upon completion of the project. (100%).

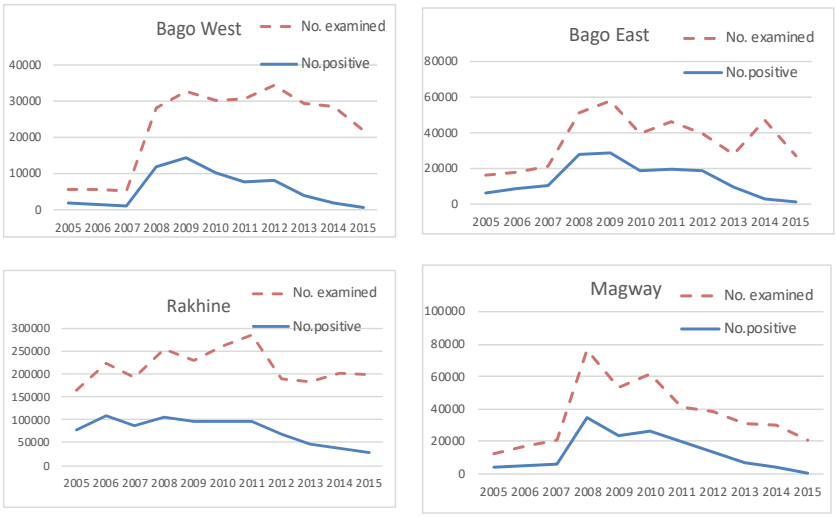
Output 2 The community-based malaria control program package is effectively implemented in target areas.

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 RBM[83] Core indicators (indicators for early diagnosis and prompt treatment[84], bed-net usage) [Partly achieved]	The actual results in the target area of early diagnosis and prompt treatment were 30% before the project extension period (2008) and 38% after the extension (2010). The actual result at the completion of the project is unknown because there is no record. The actual results of bud-net usage in the four target areas in 2011 were positive in general. It was from 89% to 100% for "sleeping in the bud-net at all times" and from 70% to 100% for "sleeping in a bud-net last night".[85]

[83] RBM are the measures against malaria declared by WHO in 1998. They aim to halve the mortality and morbidity rates of malaria by 2010 and halve them further by 2015.

[84] To have diagnosis and treatment within 24 hours after malaria symptoms develop.

[85] Source: P13-14, Community-based Survey on Knowledge, Attitude and Practice on malaria 2011 (Document provided by NMCP)

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.2 No. of malaria suspected patients accessing health facilities. [Improved, therefore, achieved]	As shown in the figure below, the number of suspected patients and number of patients diagnosed as positive in the East and West Bago regions continued to increase until 2009. This indicates that as a result of the promotion of findings of suspected patients by the community-based malaria control program, the number of suspected patients accessing health facilities had improved. Thereafter, although there was some variation, it was on a downward trend. This indicates that there was an effective intervention for preventing infection.[86] In Rakhine state and Magway region, which were included in the project target areas after the extension, the number of patients peaked in 2011 and 2008 respectively, and then decreased.  Number of suspected and positive patients in the target area[87]
2.3 No. of malaria patients, severe and complicated cases, and deaths at the hospitals.	See the status of achievement of indicator 2 of the Project Purpose as these indicators have the same meaning. They are macro indexes, which are more appropriate as indicators of the Project Purpose.

Output 3 System for prediction and management of epidemics is utilized in target areas.

Indicators	Status as of Terminal Evaluation or Completion of the Project
3.1 No. of townships developed and utilizing early warning system.[88] [Achieved]	This system, developed by the project, was introduced to all townships (total of 70 townships) in the target area, utilized for inventory monitoring, and functioned as an early warning system at the time of a malaria outbreak.

Output 4 Collaborative activities with other partners and sectors are strengthened.

Indicators	Status as of Terminal Evaluation or Completion of the Project
4.1 No. of meetings with collaborative sectors and partners. [Achieved]	Information sharing among VBDC staff in the project activity area and collaboration with other donors were promoted through various training programs and conferences. Furthermore, the JICA experts and VBDC staff had discussions, exchanged

[86] As the number of serious and complicated patients and malaria deaths declined at the same time, the decrease in the number of suspected / positive patients was not due to the fact that those who should be examined ceased to access health facilities and tests, but it was a decrease in the number of suspected and positive patients, and it is considered that the situation was improved as a result of prevention of infection.

[87] Document provided by NMCP at the time of the ex-post evaluation. The number of suspected patients refers to the number of patients who underwent rapid diagnostic tests or microscopic examination.

[88] The early warning system is a system that monitors the possibility of an outbreak of malaria by measuring the increase or decrease in the stock of malaria drugs.

Indicators	Status as of Terminal Evaluation or Completion of the Project
	information and opinions, and shared experience of the activities of this project with development partners such as WHO, 3MDGF[89], UNICEF, GF and others. (The external evaluator tried to identify the number of these meetings at the time of the ex-post evaluation; however, there were too many and it was not possible to do so.). Such exchange of information and opinions served as opportunities for NMCP and development partners to incorporate the mechanisms introduced by the project in their policies and programs. For example, in 2006, UNICEF focused on the microstratification map, which was developed by this project in their project proposal in 2006.[90]

【Phase 2】

Output 1 Myanmar Artemisinin Resistance Containment (MARC) Project is strengthened in the MARC area.

Indicators	Status as of Terminal Evaluation or Completion of the Project
1.1 11 townships among 51 townships embracing MARC Tier 1 and 2[91] implement malaria control program with CHW System in hard-to-reach areas in Bago Region and Kayin State. [Achieved]	Upon project completion, the malaria control program with CHW system was implemented in hard-to-reach areas in 10 townships in total, that were 8 townships in East Bago region and 2 townships in Kayin state, out of 52 townships for MARC. Shwegyin township, where many institutions were implementing malaria control activities, was excluded from the area of application of the CHW system.

Output 2 Community based malaria control is effectively conducted in Bago Region.

Indicators	Status as of Terminal Evaluation or Completion of the Project
2.1 All 8 townships eligible for ordinary malaria control program implemented program with CHW System in west part of Bago region. [Achieved]	The CHW system was implemented in 11 townships in Bago region. It was carried out beyond the original target of 8 townships as a result of the supply of goods, such as anti-malarial drugs, by VBDC being increased.

Output 3 Capacity of program management in different levels of malaria and other vector-borne diseases is strengthened.

Indicators	Status as of Terminal Evaluation or Completion of the Project
3.1 All regions/ States utilize GIS for documentation and data analysis. [Achieved]	All the states/regions used GIS maps for annual reports, and analyzed data using GIS.
3.2 4 newly developed databases are utilized for program improvement. [Achieved]	Four types of databases, "CHW Activity Monitoring Database", "CHW Personal Information Database", "Health Facilities and Basic Health Staff Database", and "Dengue Weekly Report Database" were developed and used for improving programs.

[89] The Three Millennium Development Goal Fund.

[90] P17, "Project Proposal, Prevention and Control of Malaria in Myanmar – though malaria risk micro-stratification and integrated service delivery", UNICEF (April 2006 – March 2007).

[91] MARC designated 21 TSs with strong evidence of suspected artemisinin drug-resistant malaria as tier 1. 31 townships with unclear evidence or those at the border of the tier 1 townships were designated as tier 2 (Source: P 36, National Strategic Plan Malaria Prevention and Control 2010-2016).

Output 4 Outcomes from the project are effectively utilized among the partners for further strengthening of NMCP.

Indicators	Status as of Terminal Evaluation or Completion of the Project
4.1 Quantity of the project outcomes shared, published and utilized among the partners [Achieved]	JICA Experts and NMCP officials actively participated in coordination meetings with development partners and MARC related international conferences and made 35 presentations at a total of 88 meetings. Some of the major outcomes of the project shared, published and used among the development partners are as follows: ・ Completion report on malaria control program in Bago, and Magway regions and Rakhine state (2010, 2011 and 2012) ・ Mapping of Population Migration and Malaria in the South Eastern Region of Myanmar (2013) ・ Guidelines on the Prevention and Control of Malaria in Myanmar (2013, in collaboration with IOM, WHO, Department of Health)