

Country Name	Project for Strengthening Medical Equipment Management System for Quality Health Services
State of Eritrea	

I. Project Outline

Background	The Eritrean government had made a great effort to improve basic healthcare services, although it had been difficult to secure sufficient amount of investments in healthcare. While proper maintenance of medical equipment (ME) is necessary for safe and accurate diagnosis and treatment, most ME in Eritrea was secondhand equipment provided by development partners and it was difficult to repair such equipment when they malfunctioned, which made it difficult for maintenance awareness to take root among medical staff (ME end-users) in workplaces. In addition, the Bio-Medical Engineering Unit (BMEU ¹), which is a subordinate body to the Ministry of Health (MOH) and solely responsible for maintenance and management of ME in Eritrea, had only responded to repair requests as needed and had not taken measures to prevent a breakdown of ME sufficiently. MOH saw such situation as a problem and aimed at establishing a preventive maintenance system centering on BMEU.												
Objectives of the Project	Through preparing a national guideline for ME management, improving capacity and performance of BMEU, improving work environment at target hospitals, and realizing preventive maintenance practice to be routinely conducted at target hospitals, the project aimed at improving management practice (including maintenance) for ME at target hospitals (Project Purpose), thereby contributing to dissemination of improved management practice for ME to other referral and zonal hospitals (Overall Goal). The project objectives set forth are as follows:												
	<ol style="list-style-type: none"> Overall Goal: Improved management practice for ME is disseminated to other referral and zonal hospitals. Project Purpose: Management practice (including maintenance) for ME at target hospitals is improved. 												
Activities of the project	<ol style="list-style-type: none"> Project site: Asmara, the capital city of Eritrea (MOH, BMEU and target hospitals: Orotta Hospital, Halibet Hospital and Villagio Ginio Hospital) Main activities: (1) Prepare a national guideline for ME management; (2) Conduct trainings to strengthen instruction abilities of BMEU on maintenance of ME; and (3) Implement 5S² activities and preventive maintenance at target hospitals, etc. Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">Eritrean Side</td> </tr> <tr> <td>1) Experts: 8 persons</td> <td>1) Staff allocated: 12 persons</td> </tr> <tr> <td>2) Trainees received in Japan: 3 persons (and trainees in Asia-Africa Knowledge Co-Creation Program (AAKCP): 6 persons)</td> <td>2) Office space and facilities: project office spaces in the MOH and the BMEU</td> </tr> <tr> <td>3) Equipment: maintenance equipment etc.</td> <td>3) Local Cost: utility costs of the project office</td> </tr> </table> 					Japanese Side	Eritrean Side	1) Experts: 8 persons	1) Staff allocated: 12 persons	2) Trainees received in Japan: 3 persons (and trainees in Asia-Africa Knowledge Co-Creation Program (AAKCP): 6 persons)	2) Office space and facilities: project office spaces in the MOH and the BMEU	3) Equipment: maintenance equipment etc.	3) Local Cost: utility costs of the project office
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Ex-Ante Evaluation	2007	Project Period	May 2008 – May 2011	Project Cost	(ex-ante) 230 million yen (actual) 254 million yen								
Implementing Agency	The Ministry of Health (MOH), The Bio-Medical Engineering Unit (BMEU) Orotta Hospital, Halibet Hospital, Villagio Ginio Hospital												
Cooperation Agency in Japan	TA Networking Corp.												

II. Result of the Evaluation

1 Relevance
<p><Consistency with the Development Policy of Eritrea at the time of ex-ante evaluation and project completion></p> <p>The project was consistent with Eritrea's development policy on 'improvement of ME management' as set forth in the "Health Sector Strategic Development Plan (HSSDP) 2010-2014" (under preparation at the time of ex-ante evaluation and approved in March 2010).</p> <p><Consistency with the Development Needs of Eritrea at the time of ex-ante evaluation and project completion></p> <p>Most ME in Eritrea was secondhand equipment provided by development partners. There was a wide variety of manufacturers even for ME used for the same purpose, different consumables such as spare parts needed to be used for each type of equipment, and maintenance manuals or operation manuals were not available for many equipment, which made it difficult to repair them when they malfunctioned. At the time of project completion, construction of satellite workshops³ was under progress in regional provinces (zones), indicating needs for maintenance of ME. Further, repair requests for ME which could not be handled in these workshops increased at BMEU, based on which the needs for maintenance of advanced ME are considered to have increased. Thus, the project is consistent with development needs of Eritrea.</p> <p><Consistency with Japan's ODA Policy at the time of ex-ante evaluation></p> <p>In policy consultations with the Eritrean government in May 2001, it was agreed to emphasize basic human needs (health, education and water) and infrastructure development as priority areas of assistance.</p> <p><Evaluation Result></p> <p>In light of the above, the relevance of the project is high.</p>
2 Effectiveness/Impact

¹ Medical Equipment Engineering Division (MEED) since 2013. To avoid confusion, this report basically calls this organization BMEU.

² 5S stands for Seiri (Sort), Seiton (Set), Seisou (Shine), Seiketu (Standardize) and Shituke (Sustain).

³ A satellite workshop is located mainly at a provincial referral hospital for repair of ME of health institutions within the province.

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

The Project Purpose was achieved by the time of project completion. While ME management function was not integrated to a 5S committee at each pilot hospital following a judgment that the monitoring of statuses of ME and promotion of preventive maintenance, the basic role of a ME management team (“committee” after October 2010), should be managed as a special function independently from 5S. Instead, activities of 5S committee and ME management team (committee) were clarified, and an effective and efficient ME management system including preventive maintenance which was to generate synergetic effects by fulfilling both committees’ functions was established (Indicator 1). Moreover, semi-annual ME monitoring was conducted twice by ME management team (committee) using ME check sheet (Indicator 2). Furthermore, more than approximately 70% of medical staff in target hospitals replied that they were either ‘very satisfied’ or ‘satisfied’ with operability of ME (Indicator 3).

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

After project completion, 5S committee and ME management committee have still been functional, ME monitoring has been conducted, and medical staff replied that they have been generally ‘satisfied’ on average with operability of ME at Halibet Hospital. On the other hand, at Orotta Hospital and Villagio Ginio Hospital, where there have been an expansion and/or a temporary closure of hospitals, committees have not been re-established afterwards. The underlying situations included the increase in separation of young technicians from service following the United Nations Security Council's resolution on sanctions in December 2011 and the integration/expansion of hospitals among some target hospitals. Consequently, committees are not functional and ME monitoring is not conducted by committees at the time of ex-post evaluation (maintenance of ME is conducted by technicians who received technical transfers under the project and/or foreign doctors and engineers). However, BMEU, which was upgraded from an ‘unit’ to a ‘division’ in 2013, recognized the importance of regular monitoring and guidance for ME users conducted as activities of this project. Accordingly, BMEU complements ME monitoring of each hospital through provision of guidance including patrol monitoring and preventive maintenance at each hospital (it patrols all hospitals across the country and carries out periodic monitoring and supervision of ME nearly 30 times on average per hospital). Also, the success rate of repairs of ME during hospital visit by BMEU has been over 90%, and thus high levels of technical skills have been maintained.

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

The Overall Goal has been partially achieved by the time of ex-post evaluation. At MOH, particularly the 5S team consisted of former JICA trainees has promoted establishment of committees and implementation of monitoring in health centers as well as hospitals nationwide to disseminate the ME management system under the supervision of the Health Service Facility Management Division. Regarding dissemination to referral and zonal hospitals other than target hospitals, the ME management committee has been established under the 5S committee in all of referral hospitals and the half of zonal hospitals (while the system is under re-establishment at Orotta Hospital, as mentioned above), among which on-the-job-trainings (OJT) on maintenance of ME have been conducted in accordance with decisions of each committee at part of these hospitals. According to MOH, the reason for ME management committee having not been established in half of zonal hospitals is a lack of technicians in each hospital.

<Evaluation Result>

In light of the above, under the project, the Project Purpose was achieved by the time of project completion, however, project effects have been maintained at part of target hospitals and the degree of achievement of the Overall Goal is partial at the time of ex-post evaluation. Therefore, the effectiveness/impact of the project is fair.

Achievement of project purpose and overall goal

Aim	Indicators	Results
(Project Purpose) Management practice (including maintenance) for ME at target hospitals is improved.	1. ME management function is integrated to 5S committee.	Status of the achievement: achieved (partially continued) (Project Completion) Although there are some common areas between 5S and ME management, it was thought under the project that promotion of ME monitoring and preventive maintenance, which is the basic function of the ME management committee, should be treated as a special function separate from 5S. Some of the committee members were overlapping and the activities of both organizations were arranged so that a synergistic effect could be aimed for while maintaining a relaxed cooperative relationship and facilitating the respective functions of each. Rather than a simple overlapping of functions, it was thought that an effective and efficient ME management setup that includes preventive maintenance was established. (Ex-post Evaluation) While some staff have left Halibet Hospital, 5S committee and ME management committee are still functional. Orotta Hospital has become a general hospital by adding the obstetrics and the pediatrics hospitals to the surgical hospital, which was the target of this project, since project completion, and 5S committee and ME management committee have not been re-established since the integration/expansion of the hospital. Villagio Ginio Hospital was closed from March 2011 to the end of October 2013, and major staffs have been replaced by other staffs due to the relocation of the hospital for a renovation of the tertiary ophthalmic hospital, and thus these committees have not been functional.
	2. Condition of ME is monitored using ME check sheet by ME management team of the 5S committee.	Status of the achievement: achieved (partially continued) (Project completion) The ME management team (‘committee’ from October 2010) of each pilot hospital conducted semi-annual ME monitoring twice using the ME check sheet under the guidance of BMEU and Japanese experts. (Ex-post Evaluation) At Halibet Hospital, ME monitoring has been

		conducted for 12 times per year from 2011 to 2012, and six times per year since 2013, when some staff left the hospital. At Orotta Hospital, while ME monitoring had been conducted for six times per year until 2012, when the hospital was integrated as mentioned above, it has not been conducted since 2013, as two technicians have left the hospital. At Villagio Ginio Hospital, ME monitoring has not been conducted since project completion for the reason explained above. However, BMEU complements ME monitoring of each hospital through patrol monitoring (and guidance) at each hospital.
	3. More than 50% of service-providers are satisfied with operationality of ME.	Status of the achievement: achieved (partially continued) (Project completion) As a result of the end-line survey, the ratio of health personnel either 'very satisfied' or 'satisfied' with operationality of ME was found to be 68% at Orotta Hospital, 71% at Halibet Hospital and 89% at Villagio Ginio Hospital (no mention of the denominator in available documents) . (Ex-post Evaluation) In the interview survey for several staff members including ME management staff of each hospital, Halibet Hospital replied 'satisfied', as there is no problem in using ME, though ME have some problems. Orotta Hospital replied 'neither satisfied nor unsatisfied', as there were technical issues (intangible issues) in ME maintenance, while these issues have been solved by the time of ex-post evaluation. Villagio Ginio Hospital replied 'very satisfied', as there is no problem.
(Overall goal) Improved management practice for ME is disseminated to other referral and zonal hospitals.	1. ME management function is integrated to 5S committee.	Status of the achievement: partially achieved (Ex-post Evaluation) ME management committee has been established under 5S committee in all of referral hospitals and the half of zonal hospitals (however, ME management committee is under re-establishment after the integration of the hospital at Orotta Hospital, as stated in Indicator 1 of Project Purpose).
	2. Condition of ME is monitored using ME check sheet by ME management team of the 5S committee.	Status of the achievement: partially achieved (Ex-post Evaluation) ME monitoring at each hospital is conducted mainly by BMEU, while this is different from what was expected in the beginning of the project in which each hospital conducts ME monitoring itself (BMEU patrols all hospitals across the country and carries out periodic monitoring and supervision of ME nearly 30 times on average per hospital).
	3. More than 50% of service-providers are satisfied with operationality of ME.	Status of the achievement: partially achieved (Ex-post Evaluation) Two out of three national referral hospitals in total and one out of six zonal hospitals in total replied to the end-line survey, in which the level of satisfaction was approximately 62.5% in referral hospitals and approximately 75% in zonal hospitals.

Source: Terminal Evaluation Report, questionnaire survey to MOH, BMEU, and Orotta, Halibet, Villagio Ginio and Hazhaz Hospitals

Note: While the wording of the indicators is the same between Project Purpose and Overall Goal, the target hospitals are different as follows:

- Target of Project Purpose: the pilot hospitals (Halibet Hospital, Orotta Hospital and Villagio Ginio Hospital)
- Target of Overall Goal: all referral hospitals (Halibet Hospital, Orotta Hospital and the ophthalmic hospital (as of the time of ex-post evaluation)) and zonal hospitals

3 Efficiency

The project period was as planned (ratio against the plan: 100%), however, project cost was slightly higher than planned (ratio against the plan: 110%). Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

According to HSSDP (2012-2016), which is implemented at the time of ex-post evaluation, it is stated in the chapter of 'Basic Health Care Package (BHCP) Essential Systems' that "ME maintained and adjusted appropriately is necessary for provision of efficient and effective clinical services, and establishment of reliable ME management and preventive maintenance system and awareness raising and practice of preventive maintenance are necessary for securing the quality and function of ME in all levels of medical institutions". Thus, improvement of ME management is still emphasized as a national policy in Eritrea, and the project is still important in the country.

<Institutional Aspect>

MOH manages the statuses/conditions and procurement of ME across the country using the ME database system. BMEU was upgraded from an 'unit' to a 'division' (MEED) in 2013, and the ME Engineering Service Unit and the Procurement and Training Unit were established under the division. At the time of ex-post evaluation, 50 staff in total work for BMEU, of which three staff are engineers, 13 are technicians, and 34 are in charge of general affairs. The number of engineers and technicians is sufficient, as BMEU has been enabled to conduct more organizationally systematic activities by the promotion. Engineers are absent in target hospitals, as there are stringent conditions to become an engineer and the total number of engineers is low in the country. At the time of ex-post evaluation, there is only one technician at Orotta Hospital mainly due to the turnover of young technicians, there are three technicians at Halibet Hospital, and there is no technician and instead a pharmacist is in charge of ME management at Villagio Ginio Hospital. The number of technicians is not sufficient at these hospitals, and at least one technician would be needed at Villagio Ginio Hospital.

<Technical Aspect>

OJT is conducted three to four times a year to improve technical skills of staff at BMEU, and one to two technicians per zone from six zones in total in the country are invited to BMEU every year to attend two weeks training and OJT after the training. On the other hand, among target hospitals, ten days training and OJT are provided for newly assigned technicians using explanatory booklets and/or user manuals of ME at Halibet Hospital, however, trainings are not conducted at the other two hospitals. As young technicians who received technical transfers have left these hospitals, knowledge and skills for preventive maintenance did not take root in target hospitals, and thus

they need to rely on support from BMEU.

<Financial Aspect>

BMEU irregularly requests MOH for budget allocation as needed bases. BMEU has also received financial support of 50,000 dollars for trainings, rental cars and consumables etc. from the Global Fund to Fight AIDS, Tuberculosis and Malaria recently. However, financial data including MOH budget and financial information of BMEU and target hospitals was claimed to be confidential and could not be obtained. As BMEU has been able to conduct ME maintenance and technical guidance etc., a certain amount of financial resources is considered to have been secured.

<Evaluation Result>

In light of the above, while sustainability is confirmed in the policy aspect, some problems have been observed in terms of institutional and technical aspects of the implementing agencies. Therefore, the sustainability of the effectiveness through the project is fair.

5 Summary of the Evaluation

The project achieved the Project Purpose, “improvement of management practice for ME at target hospitals”, as planned. However, project effects have been only partially maintained due to manpower shortage and organizational change etc. Regarding the Overall Goal, dissemination to referral and zonal hospitals in the country has been partially achieved. As for sustainability, problems have been observed in institutional and technical aspects of target hospitals. However, ME maintenance can be continuously conducted, as the central agency conducts ME maintenance at each hospital supplementarily, although this is different from what was expected in the beginning of the project.

Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learned

Lessons learned for JICA:

After project completion, there are uncertainties for sustainability of ME maintenance by 5S committee and ME management committee at each hospital due to turnover of young technicians and integration/expansion of hospitals among target hospitals. On the other hand, the central agency has conducted ME maintenance at each hospital supplementarily, which is enabling the continuation of ME maintenance although that is different from what was expected in the beginning of the project. In case there was a concern on sustainability of the project effects at each hospital during project implementation, it would have been an option to suggest to consider shifting the project implementing agency from each hospital to the central agency that had higher prospect for sustainability.



Technician inspecting ME of the surgical treatment room (Orotta Hospital)



Technician repairing electronic component (BMEU)