Democratic Socialist Republic of Sri Lanka

Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for Improvement of Anuradhapura Teaching Hospital"

and

"The Project for Improvement of Anuradhapura Teaching Hospital (Phase II)"

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0. Summary

This project aimed to enhance the quality of healthcare services for the residents of the Anuradhapura Teaching Hospital (AT Hospital) catchment area by improving its facilities and medical equipment at the Outpatient Department[1],Obstetrics and Gynaecology (OB/GYN) Operation Department, Paediatric Intensive Care Unit (PICU), and Neonatal Intensive Care Unit (NICU). AT Hospital is situated in Anuradhapura, which is the provincial capital of North Central Province in Sri Lanka, as well as the district capital of Anuradhapura District.

The relevance of this project is high as it is consistent with the national development policy and needs of Sri Lanka both at the time of project planning and the time of ex-post evaluation, as well as with Japan's aid policy for Sri Lanka at the time of project planning. Since the project completion, the number of outpatients in the Outpatient Department has increased, as has the number of OB/GYN operations. The NICU bed occupancy rate has also improved. Furthermore, the patients and medical staff have indicated high levels of satisfaction. AT Hospital staff have become more efficient in their work and the quality of healthcare services has improved. Thus, it can be concluded that the project produced a sufficient effect. In addition, this project has contributed to the enhancement of AT Hospital's function as a teaching hospital. The provision of quality healthcare services to its catchment area and areas formerly controlled by the Liberation Tigers of Tamil Eelam (LTTE) as the tertiary hospital in the North Central Province has been enhanced through the project. Taking this into consideration, the effectiveness and impact of the project are high. The efficiency of the project is fair as the project cost was within the plan while the project period exceeded the plan. In terms of Operation and Maintenance (O&M), an O&M system was established and no issues that interfere with the O&M budget have identified, but there remain challenges regarding the technical skills of O&M staff. Therefore, the sustainability of the project effect is fair.

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

[1] The Outpatient Department at AT Hospital had 26 specialised outpatient clinics at the time of the basic design study. The project covered improvement of 20 of these clinics (as shown in 3.2.1.1 Table 1) and a walk-in clinic.

1. Project Description

Project Location[2]

Anuradhapura Teaching Hospital[3]

1.1 Background[4]

Since gaining independence in 1948, Sri Lanka has focused on welfare, and health services are available to all citizens free of charge. However, there has been a great disparity in health services between regions. In particular, the north-eastern area[5] as well as the north-central area (which consists of North Central Province, parts of Northern Province and parts of North Western province), which is the catchment area of AT Hospital was affected by the long years conflict and suffered from high rates of poverty compared to other districts[6]. Health indices such as the maternal mortality rate and infant mortality rate[7] in the north-central area were higher compared to other areas in Sri Lanka. For instance, the maternal mortality rates (per 100,000 live births) of districts in the area directly serviced by AT Hospital in 2006 (before the project) were: Anuradhapura District (29.7), Vavuniya District (39.3), Mannar District (46.2), and Puttalam District (51.6) compared to the country average 39.3. The average infant mortality rates (per 1,000 live births) for the ten-year period preceding the survey (undertaken in 2006–2007) were: Anuradhapura District (27) and Puttalam District (23) compared to the country average 10.9 in 2007[8].

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[2] Map from http://www.studentsoftheworld.info/infopays/maps/SRI_map.gif

[3] Photo taken by the evaluator in January 2014.

[4] Some parts of this section are excerpts from the Basic Design Study Report on the Project for Improvement of Anuradhapura Teaching Hospital in the Democratic Socialist Republic of Sri Lanka (2008). Where sources other than the Basic Design Study Report are drawn on, this will be noted in an explanatory note.

[5] Ethic conflict broke out in 1983 between the LTTE, a separatist militant organisation that advocated the separation of the northern and eastern areas of Sri Lanka for the Tamil people, and the Government of Sri Lanka. The conflict lasted until 2009. The north-eastern area consists of Northern Province (five districts: Jaffna, Mullaitivu, Kilinochchi, Mannar and Vavuniya) and Eastern Province (three districts: Trincomalee, Batticaloa, Ampara). During the period of conflict, parts of Northern and Eastern Provinces with large Tamil populations were controlled by the LTTE, such as Kilinochchi and Mullaitivu Districts. The other six districts were partially controlled by the LTTE and divided from government-controlled areas. (Refer to p.101-109 Noriko Iseki (2005) "International effort to contribute toward the needs of rehabilitation and reconstruction of Sri Lanka" Modern Media, Vol.51, No.5), Original article was written in Japanese.

[6] According to the Household Income and Expenditure Survey 2006–2007 (Department of Census and Statistics, Ministry of Finance and Planning Sri Lanka), the poverty headcount ratio of the north-central area was worse than other provinces (and districts belongs to provinces). For a detailed poverty headcount ratio, refer to Millennium Development Goals Country Report 2008–09, UNDP.

[7] An infant is defined as up to one year after birth, and neonate is up to the first 28 days after birth.

[8] For the country average maternal mortality rate and infant mortality rate, refer to Family Health Bureau, Ministry of Health Sri Lanka. For the average infant mortality rate for the ten-year period preceding the survey of 2006–2007, refer to Demographic and Health Survey 2006–2007, Department of Census and Statistics, Sri Lanka. There was no data for the

In March 2006, the Government of Sri Lanka (GoSL) decided to raise the status of AT Hospital from a provincial general hospital to a teaching hospital and to expand its role, functions, equipment, and healthcare services as the only tertiary hospital in North Central Province[9]. At that time, approximately 1.8 million people lived in the catchment area of AT Hospital, and many Tamil patients were transferred from the north-eastern area because of insufficient medical facilities there due to years of ethnic conflict. As a result, AT Hospital was chronically overcrowded. The average bed occupancy rate was 115 percent and the hospital was providing care to approximately 1,050 outpatients per day. This situation was impeding the appropriate provision of healthcare services.

AT Hospital was first established in 1958, and many of the original facilities had deteriorated and were decrepit at the time of project planning. In particular, most of the outpatient clinics were located in a former administration building, which had no waiting areas for patients. Patients were crowded into a small corridor, so that the flow lines of patients and healthcare personnel were entangled.

Under such circumstances, AT Hospital required the construction of new facilities and the procurement of necessary medical equipment according to the newly-developed master plan for the teaching hospital, which was approved by the Ministry of Healthcare and Nutrition (MOH). However, the self-help efforts of the GoSL were limited to primary and secondary healthcare facilities, and it was difficult to cover the improvement of a tertiary medical facility, which would require a considerable sum of money. The GoSL therefore requested grant aid assistance from Japan for the construction of facilities and supply of equipment at AT Hospital.

1.2 Project Outline

The objective of this project was to improve quality healthcare services for the residents of the AT Hospital catchment area through the improvement of facilities, and medical equipment in the Outpatient Department, OB/GYN Operation Department, PICU and NICU of AT Hospital.

Grant Limit / Actual Grant Amount	Phase 1: 1,803 million yen / 1,343 million yen Phase 2: 390 million yen / 347 million yen
Exchange of Notes Date (Grant Agreement Date)	Phase 1: May 2008 Phase 2: January 2009

infant mortality rate of Vavuniya and Mannar Districts.

[9] Public health facilities in Sri Lanka are categorised as primary, secondary and tertiary. Primary health facilities, such as health centres, do not have specialised outpatient clinics due to the absence of medical consultants and only provide services like vaccinations and simple consultations. Secondary health facilities, such as Base Hospitals and District General Hospitals, have some major specialised outpatient clinics, such as medical, surgical, OB/GYN and paediatrics, together with inpatient wards. They provide minor operations as well. Tertiary health facilities such as Teaching Hospitals and Provincial General Hospitals, have many specialised outpatient clinics together with inpatient wards and intensive care unit facilities so that patients can receive more advanced healthcare services than at secondary health facilities. If provincial general hospitals are appointed as affiliated hospitals to medical faculties of universities, they are called teaching hospitals.

Implementing Agency	Responsible Agency: Ministry of Healthcare and Nutrition[10] Implementing Agency: Anuradhapura Teaching Hospital
Project Completion Date	September 2010
Main Contractors	Construction: Kitano Construction Corporation Procurement of Equipment: Mitsubishi Corporation
Main Consultants	Yamashita Sekkei Inc. and International Total Engineering Corporation
Basic Design	June 2007–February 2008
Detailed Design	March 2008–February 2009
Related Projects	[Technical Cooperation] -Master Plan Study for Strengthening Health System (2002–2003) -The Study on Evidence-Based Management for Health System (2005–2007) [Non-JICA Projects] - North East Community Restoration and Development Project (ADB[11], OPEC funds[12], GTZ[13], Netherlands, Finland, Norway, etc. 2002–2008) - Improvement of antepartum ward (UNICEF, 2006) - Construction of renal research and treatment centre (Renal Foundation, 2006–2007) - Purchase of seven vehicles for preventive medicine staff (World Bank, 2006)

[10] The official name of the MOH was "Ministry of Healthcare and Nutrition" at the time of project planning. Since 2010, it has been known as "Ministry of Health".
[11] Asian Development Bank.
[12] Organization of the Petroleum Exporting Countries.
[13] Deutsche Gesellschaft fur Technische Zusammenarbeit.

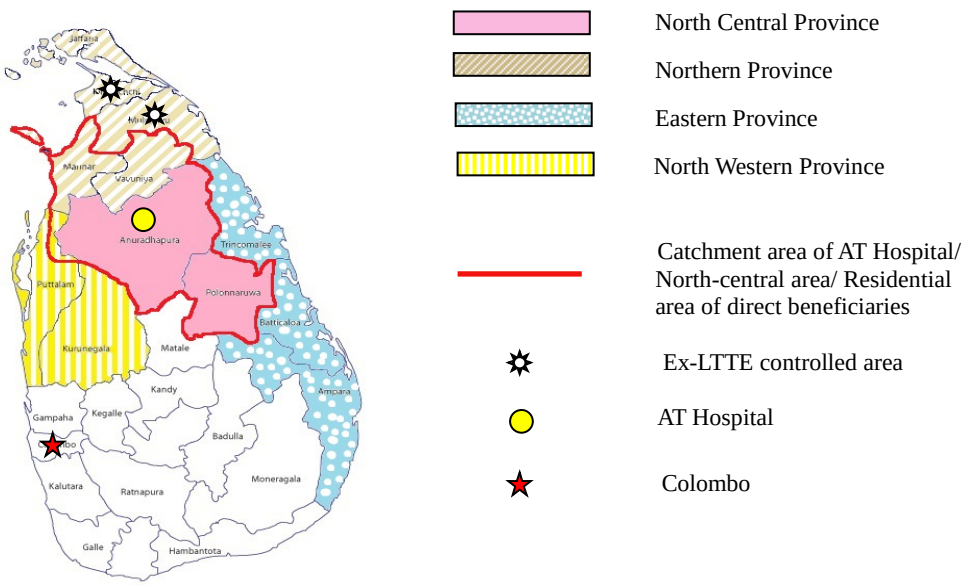


Figure 1 Residential area of direct beneficiaries and indirect beneficiaries of the project[14]

2. Outline of the Evaluation Study

2.1 External Evaluator

Chiho Ikeda, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: October, 2013–October, 2014

Duration of the Field Study: January 5–19, 2014 and April 20–24, 2014

3. Results of the Evaluation (Overall Rating: B[15])

3.1 Relevance (Rating: ③[16])

3.1.1 Relevance to the Development Plan of Sri Lanka

The project intended to promote quality healthcare services for the residents of the AT Hospital catchment area through improvement of tertiary care facilities in North Central Province. The Sri Lankan development framework called "Mahinda Chintana: Vision for a New Sri Lanka" stated that, "Ensuring easy access to quality and modern healthcare services for all, with emphasis on needs of the lower income groups and those most vulnerable in society, will be the main focus of the health sector in the medium term 2007–2016"[17]. This concept was also designated as one of the five

[14] Mapped by the evaluator based on a map from http://www.abansfinance.lk/images/sri-lanka-map.png
The direct catchment area of the project included North Central Province (Anuradhapura District and Polonnaruwa District), Vavuniya District, Mannar District, and part of Puttalam District. The indirect catchment area was ex-LTTE-controlled areas, comprising Northern Province (five districts: Jaffna, Mullaitivu, Kilinochchi, Mannar and Vavuniya) and part of Eastern Province (three districts: Trincomalee, Batticaloa, Ampara). However Vavuniya and Mannar Districts were also part of the direct catchment area of the project.

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

[16] ③: High, ②: Fair, ①: Low.

[17] P.155 "Mahinda Chintana: Vision for a New Sri Lanka. A Ten Year Horizon Development Framework 2006–2016 Discussion Paper".

strategic objectives in the Health Master Plan (2006–2016) produced by the MOH: "to ensure the delivery of comprehensive health services" which includes rationalising and strengthening the health network of facilities and services. Thus, the project was in line with the policy of the GoSL at the time of project planning.

At the time of ex-post evaluation, "Mahinda Chintana: Vision for the Future Public Investment Strategy, Unstoppable Sri Lanka (2014–2016)", which was revised in 2013 from the original Mahinda Chintana[18], set out the strategic direction for providing advanced healthcare services through a strengthened healthcare delivery system. This was to be achieved through the provision of essential infrastructure, equipment, and human resources at all levels to develop the hospital network in order to implement universal health coverage (UHC)[19].

Therefore, the project was relevant to Sri Lanka's development plan at the time of project planning as well as the time of ex-post evaluation.

3.1.2 Relevance to the Development Needs of Sri Lanka

At the time of project planning, Sri Lanka had a great disparity in healthcare services between regions. In particular, health indices such as the maternal mortality rate and infant mortality rate in the catchment area of AT Hospital and the conflict-affected north-eastern area were remarkably higher than other districts. In addition, many patients were transferred to AT Hospital from the LTTE-controlled area of Northern Province, which suffered from underdevelopment of medical facilities due to the long years of ethnic conflict. Under such conditions, AT Hospital could not provide the appropriate healthcare services of a tertiary hospital because most facilities were decrepit, and medical equipment was old[20].

Although the infant mortality rate of Anuradhapura District, in which AT Hospital is located, had improved by the time of ex-post evaluation, it still has a higher rate than some other districts. In addition, the number of outpatients visiting the AT Hospital to access facilities such as the cardiology clinic has increased year by year due to the increase of non-communicable disease patients in Sri Lanka. Thus, the healthcare services of AT Hospital are highly demanded by patients, as it is the only tertiary hospital in North Central Province. The number of patients transferred to AT Hospital from indirectly covered areas has decreased due to the improvement of health facilities in Northern Province after the end of the 26 year ethnic conflict in May 2009, such as at Jaffna Teaching Hospital (TH Jaffna, tertiary), District General Hospital Kilinochchi (DGH Kilinochchi, secondary), District

[18] Mahinda Chintana has been revised twice. The first revision was in 2010 as "Mahinda Chintana: Vision for the Future" and the second revision was in 2013, which further revised the first revision.

[19] UHC is defined as "ensuring that all people can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship". (WHO: http://www.who.int/health_financing/universal_coverage_definition/en/)

[20] The result of medical equipment inspection at the time of the basic design study showed 79 items that were unable to continue to be used and 25 items that were partially unable to continue to be used out of 183 inspected items.

General Hospital Mullaitivu (DGH Mullaitivu, secondary) and District General Hospital Vavuniya (DGH Vavuniya, secondary). However, AT Hospital still receives some patients from ex-LTTE-controlled areas because some specialised clinics, such as for neurosurgery, have not yet been improved in Northern Province[21]. Furthermore, AT Hospital is the nearest tertiary hospital for residents of Vavuniya and Mannar Districts, as TH Jaffna is situated further from their residences than AT Hospital. Therefore, it can be said that the project, which aims to improve quality healthcare services for the residents of the AT Hospital catchment area through enhancement of facilities and medical equipment, met and continues to meet the needs of Sri Lanka, both at the time of project planning and ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

At the time of project planning, Japan's country assistance program for Sri Lanka (April 2004) was composed of two pillars: (i) assistance to support the consolidation of peace and reconstruction, and (ii) assistance in line with the Sri Lankan mid- and long-term vision for development. In this policy, "assistance for health and medical care" was set as a sub-sector goal of "assistance for poverty alleviation and regional development", one of the priority areas of (ii) above. In addition, the sub-sector goal "improvement of social and economic infrastructure", noted the importance of implementing balanced assistance among all ethnic group and regions, for the improvement of both social infrastructure (potable water, public sanitation, primary education, health and medical care etc) and economic infrastructure (agricultural and fisheries industries). Thus, the project was consistent with Japan's assistance policy to Sri Lanka at the project planning stage.

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

3.2 Effectiveness[22] (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

To demonstrate the quantitative effects of the project, the number of outpatients of the 20 specialised clinics that were improved by the project, the number of OB/GYN operations, the number of PICU patients, and the NICU bed occupancy rate were set as indices in the basic design study report. The indices were expected to improve from one year after project completion (2010) and onward, compared to 2006. Therefore, this evaluation compared figures of 2006 and 2013, the year of ex-post evaluation. The results were as described below, and all indices except for the number of PICU patients showed progress.

[21] Based on an interview with AT Hospital staff.
[22] The effectiveness sub-rating is to be taken into consideration when assessing impact.

3.2.1.1 Number of Outpatients of Specialised Clinics and Walk-in Clinic Improved by the Project

The numbers of outpatients between 2006 and 2013 of the 20 specialised outpatient clinics and the walk-in clinic that were improved by the project are show in Table 1.

Table 1 Number of outpatients of specialised clinics and walk-in clinic improved by the project

	2006 *(Base year)*	***2007***	***2008***	***2009***	***2010*** *completion year: September, 2010*	***2011*** *(1 year after completion)*	***2012*** *(2 years after completion)*	***2013*** *(Ex-post evaluation year)*
Walk in clinic Total	**179,415**	**176,082**	**171,610**	**190,406**	**180,511**	**183,367**	**211,031**	**242,098**
Medical	57,213	57,656	52,766	52,883	50,350	44,866	42,896	44,367
Surgery	15,704	15,322	13,136	12,072	11,850	14,249	13,906	11,486
Orthopaedics	12,234	11,991	12,201	11,407	11,388	11,094	13,585	12,377
Respiratory	13,114	5,124	4,580	5,265	5,823	6,486	7,907	10,908
Cardiology	9,583	12,271	18,037	19,244	25,496	27,087	19,814	20,552
Neurosurgery	4,483	4,067	4,045	4,253	4,930	6,004	6,650	6,062
Neurology	5,455	6,416	7,412	6,733	7,330	6,801	7,137	8,007
ENT (Ear, Nose, and Throat)	8,843	8,374	8,194	7,781	8,304	9,019	8,730	13,380
Rectal	2,019	1,922	1,877	1,598	1,640	1,188	1,695	1,312
Dermatology	13,252	13,390	13,118	14,003	18,184	27,766	25,627	31,309
Paediatrics	14,752	14,096	12,338	13,348	14,573	15,682	15,881	18,830
Neonatal	7,114	5,508	3,164	3,999	2,879	3,438	6,085	3,853
Gynaecology	5,211	6,029	5,907	5,640	6,562	6,103	7,105	8,288
Obstetrics	9,240	8,883	9,377	9,575	8,983	8,428	10,214	11,916
Family planning	1,315	744	745	857	1,081	776	379	442
Oncosurgery	2,606	2,663	2,033	2,248	774	219	486	589
Oncomedical	7,077	10,786	10,735	8,318	10,522	13,478	15,204	15,806
OMF (Oral and Maxillofacial)	8,928	9,105	9,785	9,673	8,684	7,334	8,655	9,113
Orthodontics	3,396	5,028	7,858	10,504	10,908	7,640	7,776	9,831
Rheumatology & Rehabilitation	6,634	8,405	9,309	10,167	13,215	19,705	23,724	25,106
Specialised clinic total	***208,173***	***207,780***	***206,617***	***209,568***	***223,476***	***237,363***	***243,456***	***263,534***

Source: AT Hospital
Note: The number of neonatal clinic outpatients in 2013 is the total number from January to September 2013.

The number of cardiology clinic patients has increased year by year even from before the completion of the project because non-communicable diseases have tended to increase in Sri Lanka and because AT Hospital is the only hospital with a cardiology clinic in North Central Province. Patient numbers further increased between 2010 and 2011 due to the improvement of facilities and medical equipment through the project[23]. The number of patients of the clinics of ear, nose and throat (ENT); dermatology; and rheumatology and rehabilitation also increased after completion of the project in response to the improvement of facilities and equipment, as these clinics are available only at AT Hospital in North Central Province. In addition, the appointment of medical consultants also contributed to the increase in the number of patients. For instance, it can be said that the significant increase of ENT clinic patients in 2013 was due to the appointment of a well-known

[23] Because of adjustment to next consultation intervals in all outpatient clinics, the number of patients decreased from 2012 onwards.

medical consultant[24]. The total number of outpatients across the 20 specialised clinics had increased by more than 20 percent at the time of ex-post evaluation in 2013 in spite of changes to the next consultation interval from one month to two months depending on patient's condition in order to ease patient congestion.

3.2.1.2 Number of OB/GYN operations

The number of OB/GYN operations is stated below in Table 2. The number of major obstetric operations, such as caesarean sections, has tended to increase after the project completion. The number of minor gynaecological operations (such as hysteroscopies, biopsies, and polypectomies) and major gynaecological operations (such as abdominal hysterectomies) has decreased due to the improvement of some secondary health facilities within the AT Hospital catchment area, such as at Tambuttegama Base Hospital[25]. In addition, some minor gynaecological operations can be performed at the OB/GYN ward's treatment rooms in the professorial unit (PU)[26], which was constructed by the Ministry of Higher Education (MoHE) as a teaching facility of the medical faculty at Rajarata University. Therefore, that number has not counted toward the number of OB/GYN operations. Thus, the total number of OB/GYN operations forms the shape of an arch over time.

Table 2 Number of OB/GYN operations

Type of operation		2006 (Base year)	2007	2008	2009	2010 (Completion year September 2010)	2011 (1 year after completion)	2012 (2 years after completion)	2013 (Ex-post evaluation year)
Gynaecology	Major	878	923	890	704	1,221	1,123	998	704
	Minor	3,353	3,181	3,272	2,766	1,779	1,462	1,226	1,438
	Laparoscopy	45	112	81	113	249	383	420	230
	Sterilisation	135	543	814	916	1,101	1,205	1,470	903
Obstetrics	Major	2,312	2,591	3,011	2,986	3,211	3,083	3,442	3,467
	Minor	36	44	73	122	79	69	53	77
Total		**6,759**	**7,394**	**8,141**	**7,607**	**7,640**	**7,325**	**7,609**	**6,819**

Source: AT Hospital

[24] Other than ENT, the reason for the decrease in the number of respiratory outpatients between 2007 and 2009 was the absence of medical consultants. Furthermore, the decrease in the number of oral and maxillofacial surgery (OMF) and family planning patients in specific years was also caused by the absence of medical consultants. (Interview with AT Hospital)

[25] According to an interview with Tambuttegama Base Hospital (secondary health facility), which is located one hour by car from AT hospital, they conduct around 150 major operations per month and 300 minor operations per month. The number of referrals and transfers to AT Hospital has decreased after strengthening OB/GYN consultant capacity.

[26] The medical faculty students receive practical training at the PU. The establishment of the medical faculty in Rajarata University was decided in July 2006 by the MoHE, after AT Hospital was upgraded to a teaching hospital in March 2006. PU was constructed from 2009 to 2012 and was completed in February 2012. It functions as a patient ward as well. It has several patient wards including a medical ward (male: 52 beds, female: 43 beds), surgical ward (male: 44 beds, female: 45 beds), obstetrics ward (antenatal: 37 beds, postnatal: 35 beds, labour room: 10 beds), gynaecology ward (44 beds) and paediatric ward (59 beds). As the establishment of the medical faculty in Rajarata University was under the control of the MoHE and not the MOH, construction of PU in AT Hospital premises was not proposed at the time of project planning. (Interview with AT hospital)

3.2.1.3 Number of PICU Patients

The number of PICU patients has decreased as shown in Table 3. There are two main reasons for the decrease in the number of patients. The first reason is the decrease in number of patients transferred from Northern Province due to the improvement of health facilities there. The second reason is the enhancement of the paediatric ward in the PU. Because of the improved facilities, PICU patients with relatively mild conditions can be accommodated and cared for at the ward. As for the improvement in the bed occupancy rate, having increased the number of PICU beds to eight (six for general patients and two for infectious patients) from four and improving facilities through the project also have contributed to the decrease.

Table 3 Number of patients, average length of stay (ALS), bed occupancy rate (BOR) of the PICU

	2006 (Base year)	2007	2008	2009	2010 (Completion year September 2010)	2011 (1 year after completion)	2012 (2 years after completion)	2013 (Ex-post evaluation year)
Number of PICU patients	252	235	251	250	198	239	216	191
ALS (days)	5	4	5	5	4	6	5	5
BOR	86%	64%	86%	86%	54%	65%	49%	44%

Source: AT hospital

Note: BOR = (Total number of patients for a year × ALS) ÷ (365 days × number of beds). The number of beds was four beds between 2006 and 2010, and six beds between 2011 and 2013. Although the number of beds was increased to eight from four by the project, two beds for infectious patients were not available as they were utilised for PICU storage for broken equipment.

3.2.1.4 Bed Occupancy Rate of the NICU

As per Table 4 below, the NICU bed occupancy rate has decreased since 2011, reaching almost 100 percent, by increasing the number of beds (from 19 to 27) through the project.

The decrease of PICU patients due to the decrement of patient transfers from Northern Province (due to the improvement of health facilities there after the end of the conflict as described above), and the enhancement of the paediatric ward within the PU have also contributed to the improvement of the NICU bed occupancy rate. However, the previous number of NICU beds (19 beds) was still insufficient, even for the current number of patients. The capacity of the NICU has been enhanced by increasing the number of beds and its facilities through the project.

Accordingly, the number of patients transferred to Colombo from AT Hospital has decreased since 2010 because the cause of many transfers (insufficient beds in the PICU and NICU) has decreased[27].

[27] AT Hospital (Director and medical consultant of the NICU).

Table 4 Number of patients and bed occupancy rate (BOR) of the NICU

	2006 (Base year)	2007	2008	2009	2010 (Completion year September 2010)	2011 (1 year after completion)	2012 (2 years after completion)	2013 (Ex-post evaluation year)
Number of PICU patients	2,570	-	2,060	1,497	1,976	1,259	932	1,009
BOR	404%	-	324%	235%	311%	139%	103%	112%

Source: AT Hospital

Note: BOR = (Total number of patients for a year × ALS) ÷ (365 days × number of beds). As there was no data for ALS between 2007 and 2013, it was calculated using 10.9 days (ALS in 2006). The number of beds was 19 beds between 2006 and 2010, and 27 beds between 2011 and 2013. However, the BOR of the base year was calculated as 156 percent in the basic design study report, as the number of beds calculated (49 beds) included 30 beds in OB/GYN wards utilised for NICU patients whose conditions were relatively mild. The calculation formula was【(2,570 × 10.9) ÷ [365 × (19 + 30)]】.

3.2.2 Qualitative Effects

3.2.2.1 Efficiency of Hospital Functions

The centralisation of dispersed outpatient clinics by constructing the Outpatients Department building through the project has contributed to the improvement of work efficiency by solving the entangled flow lines of hospital staff and patients. The results of a questionnaire survey given to medical staff[28] shows that staff satisfaction regarding facilities and medical equipment is high, and more than half of staff feel that their work efficiency has improved (refer to Box 1 below). According to the results of an outpatient questionnaire survey[29] (refer to 3.2.2.2), the waiting time has been reduced and patients have been able to move around the building effectively due to the improvement in flow lines.

On the other hand, there were a few negative comments from medical doctors at the walk-in clinic and PICU. This is because the walk-in clinic is still overcrowded as it is difficult to change the next consultation intervals in the same way as the specialised clinics, and many patients come directly without a referral[30]. Thus, some medical doctors at the walk-in clinic feel that there has not been any change regarding congestion as a result of the project. The PICU also faces issues with medical equipment that was procured by the MOH, not by the project, and as a result, some medical doctors complain that there is insufficient space to store broken equipment[31].

[28] The total number of respondents was 51. Their occupations were consultants, medical doctors, nurses and paramedical staff.

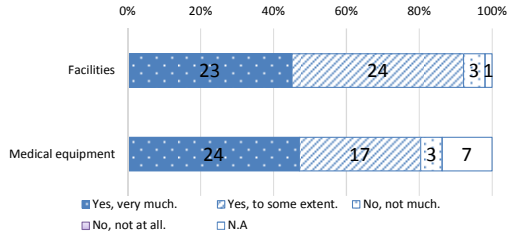
[29] The total number of respondents was 151. Respondents were patients who have received healthcare service at AT Hospital before the project, A number of patients were selected from each clinic that were improved by the project,

[30] According to the questionnaire survey given to outpatients in the walk-in clinic, only three patients out of 15 were referred from a lower-level hospital. In spite of negative comments from medical doctors, there were no negative comments, such as about overcrowding, from walk-in clinic patients. Most of them are satisfied with the renewed facilities and responded that waiting time had been reduced and the waiting space had been improved.

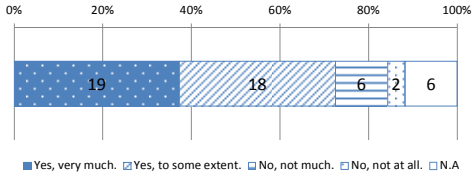
[31] Discussions about space at the PICU were held at the time of the basic design study. (Interview with MOH) Equipment has to be kept in the ward as long as it is listed in the ward's items inventory, until it is condemned and removed from the inventory by the Condemning Board. This update is usually done once every five years. Thus,even broken equipment that is difficult to repair cannot be disposed and must be kept at the PICU.(Interview with AT Hospital)

Box1 Results of questionnaire survey of medical staff at AT Hospital

■Are you satisfied with the renewed facilities and equipment?



■Do you think that the improvement of AT medical Hospital through the project has contributed to the enhancement of your work efficiency?



3.2.2.2 Improvement of Quality of Healthcare Services

Outpatients who had received healthcare services at AT Hospital before the project were largely unsatisfied with the hospital's facilities, waiting time, waiting space, flow lines, laboratory tests, quality of services and medical staff. After the project was completed, these same outpatients indicated almost 100 percent satisfaction with the current services[32]. According to the outpatient questionnaire survey, 108 out of 151 respondents now received healthcare services more frequently at AT Hospital than before the project. Respondents answered that the reasons for the increase in frequency were that "they could receive services that were not available in the old facilities", "they felt more comfortable receiving services in the renewed facilities than before" and "healthcare services provided by AT Hospital were now very reliable" (refer to Box 2)[33]. 27 out of a total of 29 individuals surveyed (14 OB/GYN inpatients, five family members of PICU inpatients, and 10 family members of NICU inpatients) also responded that access to advanced healthcare services had improved through the project (the remaining two inpatients responded that they did not know). In particular, mothers of NICU inpatients responded that their babies would not have survived without the care received at AT Hospital. Capacity enhancement of the PICU and NICU through the project enabled AT Hospital to receive more patients from neighbouring areas that are geographically closer to AT Hospital than to Colombo. As a result, cases of patient transfers to Colombo from AT Hospital due to an insufficient number of beds and facilities have decreased because AT Hospital has been able to offer more prompt diagnoses and treatment for patients with serious conditions.

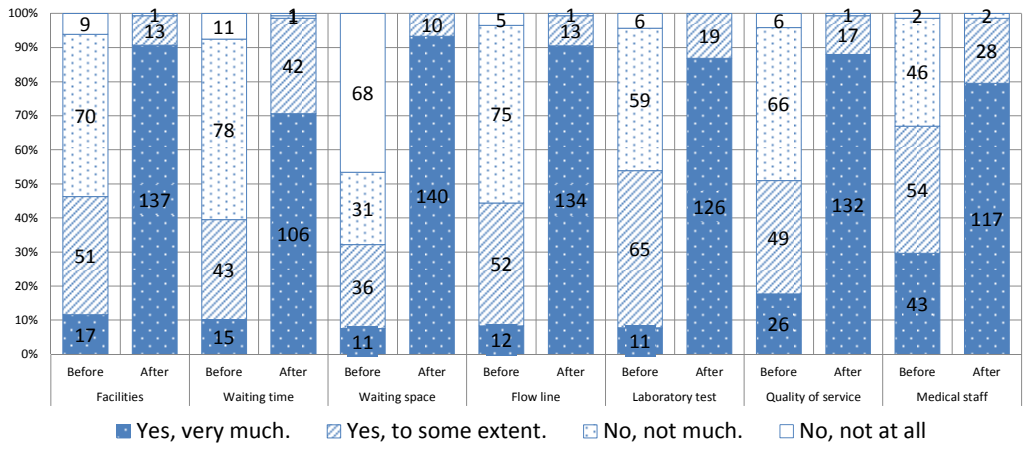
In addition, nearly 80 percent of medical staff responded that the quality of healthcare services in AT Hospital has been enhanced. Therefore, it can be said that the project has contributed to improving the quality of healthcare services in the AT Hospital catchment area as well as to providing advanced healthcare services to those areas.

[32] The following reasons were given by outpatients for increasing satisfaction: improved comfort due to sufficient waiting space; decreased waiting time; capacity to receive the results of blood tests within the day; and hospital staff are kinder than before because of sufficient staff numbers.

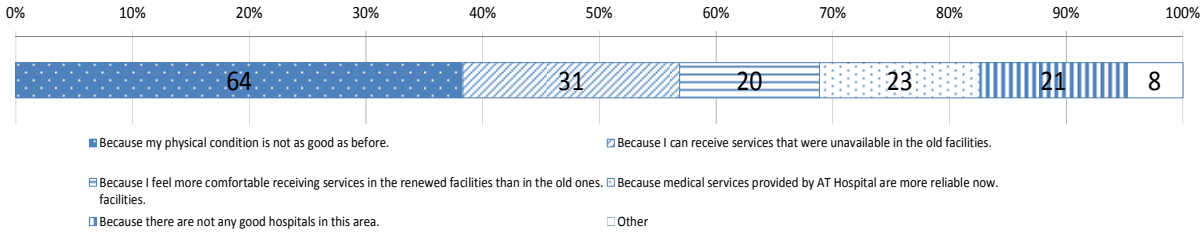
[33] The question allowed multiple answers. The 108 outpatients gave a total of 167 valid answers.

Box 2 Results of questionnaire survey regarding the quality of healthcare services

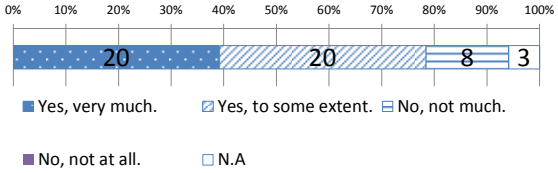
■Are (were) you satisfied with AT Hospital? (Before/after the project) *<Outpatients>*



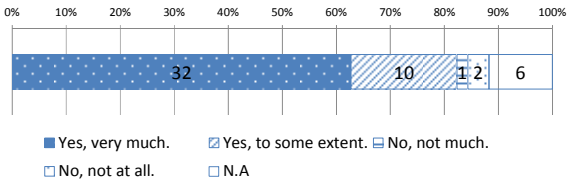
■If you visit the renewed AT Hospital more often than before, what are the reasons? *(Multiple answers) <Outpatients>*



■Do you think that the quality of healthcare services that your department offers has increased because of the renewed facilities? *<Medical staff>*



■Do you think that the improvement of AT Hospital though the project has contributed to providing quality healthcare services to the covered area? *<Medical staff>*



3.3 Impact

3.3.1 Intended Impacts

3.3.1.1 Promotion of Implementation of AT Hospital Master Plan

The project was the first stage of the AT Hospital Master Plan, which set out the improvement of AT Hospital as a tertiary hospital in stages. After the project, it was expected that the number of inpatients would increase in proportion to the increase in the number of outpatients. The next phase was to construct an improved OB/GYN ward, including a delivery room and a paediatrics ward, next to the Outpatient Department building based on the Master Plan in order to improve convenience for patients and hospital staff[34]. Although this phase of the AT Hospital Master Plan had not progressed at the time of the ex-post evaluation survey, the number of beds increased as the

[34] Reference documents provided by JICA and interview with AT Hospital.

OB/GYN (126 beds) and paediatrics (59 beds) wards were strengthened in the PU . However, as the PU has an educational function as well, the admission of inpatients is limited[35]. According to interviews with the AT Hospital, as the number of inpatients increased with the increase of the number of outpatients[36], the next phase of the Master Plan, which expects to construct OB/GYN and paediatrics wards connecting directly to the outpatient building, is scheduled to proceed as soon as the necessary budget is confirmed. Therefore, the project contribution to the improvement of the AT Hospital Master Plan has not materialised yet, but is expected to in the future.

3.3.1.2 Contribution to Decreasing Sri Lanka's Maternal Mortality Rate and Infant Mortality Rate

As the project covered the improvement of the OB/GYN Operation Department, the PICU and the NICU, it was expected to contribute indirectly to the betterment of health indices in Sri Lanka, such as the maternal mortality rate and infant mortality rate. The indices for the maternal mortality rate and infant mortality rate in 2006 (before the project) and 2012 (after the project) are shown in Table 5 below. Although the infant mortality rate in 2012 has improved compared to in 2006 across all levels (district, province and country level), the range of improvement of Anuradhapura District is small compared to the provincial and country level. Thus, the project contribution to the betterment of the infant mortality rate in Sri Lanka was minimal. The maternal mortality rate in Anuradhapura District has slightly worsened, but it has improved at the provincial and country levels[37].

Table5 Maternal mortality rate and infant mortality rate

	Maternal mortality rate (per 100,000 live births)			**Infant mortality rate (per 1,000 live births)**		
	Anuradhapura District	North Central Province	Sri Lanka	Anuradhapura District	North Central Province	Sri Lanka
2006	29.7	36.5	39.3	10.0	10.5	10.9
2012	33.6	32.0	37.7	9.4	8.9	9.2
Status	×	○	○	○	○	○

Source: Family Health Bureau, Ministry of Health, Sri Lanka (maternal mortality rate of Anuradhapura District, Sri Lanka and infant mortality rate of Sri Lanka)
AT Hospital (maternal mortality rate and infant mortality rate of North Central Province)
Regional Director of Health Services, Anuradhapura (infant mortality rate of Anuradhapura District)

3.3.1.3 Contribution to Promoting Economic Development in North Central Province

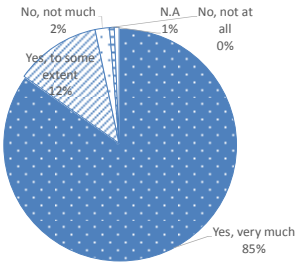
As the north-central area where AT Hospital is located adjoins the ex-LTTE-controlled north-eastern area, it was less developed than other areas. The project was expected to promote economic development by improving basic healthcare services. However, it is difficult to verify only the economic impact of the project because there were several other external factors, such as

[35] PU allows admission once every three days at the medical and paediatrics wards and twice a week at the surgical and OB/GYN wards. (Interview with AT Hospital)
[36] The total number of inpatients at AT Hospital increased by around 20,000 from 110,160 in 2006 to 129,442 in 2013. The number of beds also increased from 1,285 in 2006 to 1,861 in 2013.
[37] According to the interview with AT Hospital , it is difficult to identify the specific cause of the increase in the maternal mortality rate in Anuradhapura District because the increase rate is small.

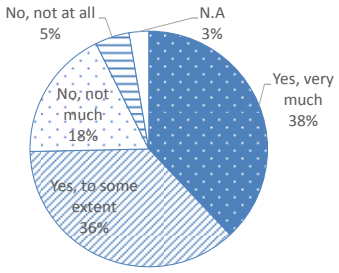
the end of ethnic conflict (May 2009), and the aggravation of kidney diseases in the north-central area[38]. Accordingly, residents of the north-central area (151 outpatients from the area who have received healthcare services from AT Hospital) were given a questionnaire survey that asked "whether they felt that the renewed facilities had helped improve their health conditions (from the perspective of improvement of basic healthcare services)", and "whether they thought that the renewed AT Hospital had contributed to an increase in family income or livelihood (from the perspective of promotion of economic development)" (refer to Box 3).

Box 3 Results of questionnaire survey of outpatients regarding economic development in North Central Province

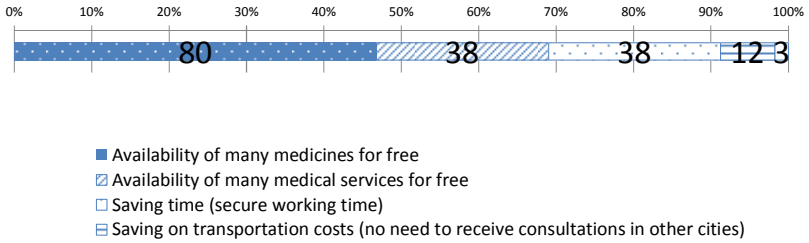
■Do you think the renewed facilities have helped improve your health conditions?



■Do you think the renewed facilities have contributed to an increase in the income of your family?



■Reasons why the renewed facilities have contributed to improved income and livelihood *(Multiple answers)*



The results showed that 97 percent of respondents thought that the project contributed to the improvement of their health condition. 74 percent of respondents thought that it contributed to their income or livelihood by enhancing free healthcare services[39], freeing up time that can be spent working due to decreased waiting time[40], and saving on transportation expenses[41].

[38] Renal disease patients have increased markedly in the north-central area. The renal research and treatment centre was developed in AT Hospital and the number of outpatients in the renal clinic has increased from 9,077 (2006) to 21,689 (2013). In order to assess the economic impact of the project, the ex-post survey was conducted from the view that health promotion for people in the north-central area by the project would enable them to secure sufficient time for work, and that this led to economic development. Aggravation of kidney diseases is regarded as an external factor hindering the enhancement of economic development in the north-central area.

[39] Some respondents commented that they received healthcare services for a fee from private hospitals before the improvement of AT Hospital through the project because they felt the healthcare services at AT Hospital were not reliable. After the improvement of AT Hospital, they now feel that the quality of healthcare services has improved and that services have become more reliable than before, so they could begin receiving healthcare services for free from AT Hospital. They are therefore now able to spend less on healthcare services.

[40] Respondents who work for hourly wages, such as famers, commented that they can work longer than before because of the reduction of waiting time after the improvement of AT Hospital through the project. Others said that they no longer need to

Therefore, it can be said that the project contributed to enhancing incomes and livelihoods of the direct target group, which is residents of north-central area, at least.

3.3.1.4 Provision of Quality Healthcare Services to North-Central Area and Ex-LTTE-Controlled Area

As AT Hospital received many transferred patients at the time of project planning, including Tamil people from ex-LTTE-controlled north-eastern areas, the project was expected to contribute to the provision of quality healthcare services to these groups indirectly. As hospitals in Northern Province have improved since the end of ethnic conflict in May 2009, residents of those areas prefer to visit TH Jaffna, which is a tertiary hospital in Northern Province, than AT Hospital at present in case when they need advanced healthcare services[42]. However, some patients were identified from ex-LTTE-controlled areas such as Mullaitivu and Kilinochchi Districts in a questionnaire survey of 50 Tamil patients[43] who receive healthcare services at AT Hospital. They receive consultations or treatment at the neurosurgery clinic at AT Hospital, as the specialised neurosurgery clinic has not been improved at TH Jaffna. At the same time, Tamil patients from Vavuniya and Mannar Districts, which are in the AT Hospital catchment area, tend to visit or be referred to AT Hospital, depending on their condition (refer to Figure 2 in 3.3.2.5). In addition, the results of the questionnaire survey of Mullaitivu District[44], an ex-LTTE-controlled area, revealed that there were several cases of referrals or transfers to AT Hospital from DGH Mullaitivu before improvement of TH Jaffna, even after the end of ethnic conflict. Currently, although TH Jaffna has improved, there are still some cases of referrals or transfers from DGH Myllaitivu to AT Hospital, such as to the neurosurgery clinic, which is not available at TH Jaffna[45]. Thus, it is said that the project has contributed to providing advanced healthcare services to the north-central area, as well as ex-LTTE-controlled areas.

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take days off on weekdays because some clinics open on Saturdays and Sundays.

[41] Some respondents commented that they received advanced healthcare services at hospitals in other districts such as Colombo or Kandy because they felt that AT Hospital healthcare services were not reliable. However, after the improvement of AT Hospital through the project, they feel that the quality of healthcare services has improved and that they have become more reliable. By receiving healthcare services at AT Hospital instead of in other districts, they can save money on transportation.

[42] Interview with MOH, AT Hospital and DGH Vavuniya and the results of the questionnaire survey of Tamil patients.

[43] Survey of 30 Tamil patients in DGH Vavuniya and 20 Tamil outpatients who have received healthcare services at AT Hospital. They were mostly residents of Vavuniya because more than half of the samples were collected in DGH Vavuniya.

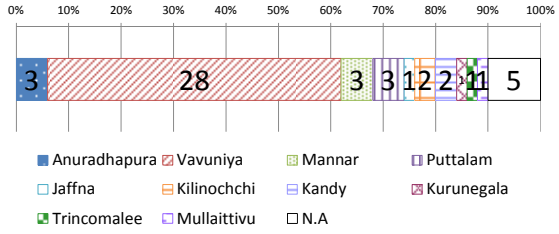
[44] Survey of 31 Tamil patients in DGH Mullaitivu who were living in Mullaitivu District before the end of ethnic conflict, Director of DGH Mullaitivu and Regional Director of health services of Mullaitivu.

[45] The number of referrals in 2013 from DGH Mullaitivu to AT Hospital was 29 and transfers were 23. (Result of questionnaire for DGH Mullaitivu)

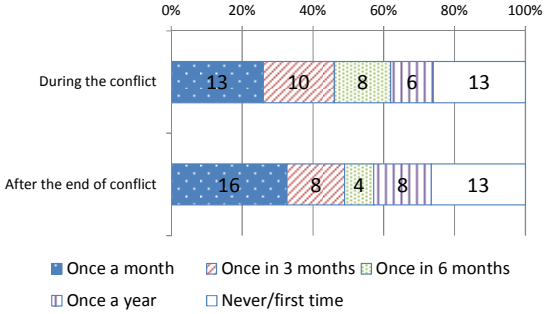
Box 4 Results of questionnaire survey of Tamil patients

<Survey of DGH Vavuniya and AT Hospital>

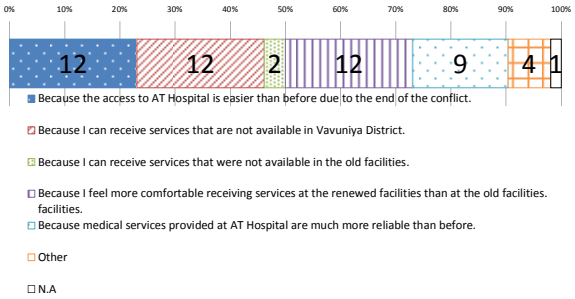
■Residence of respondents



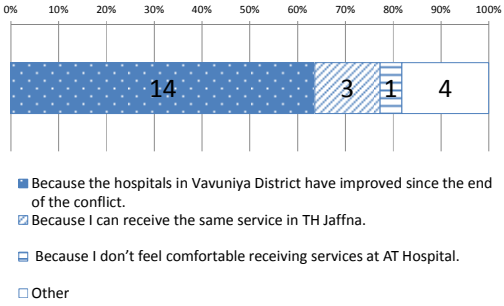
■Frequency of visiting AT Hospital
(During the conflict/after the end of the conflict)



■Why did the frequency of visits to AT Hospital increase after the end of the conflict? *(Multiple answers)*

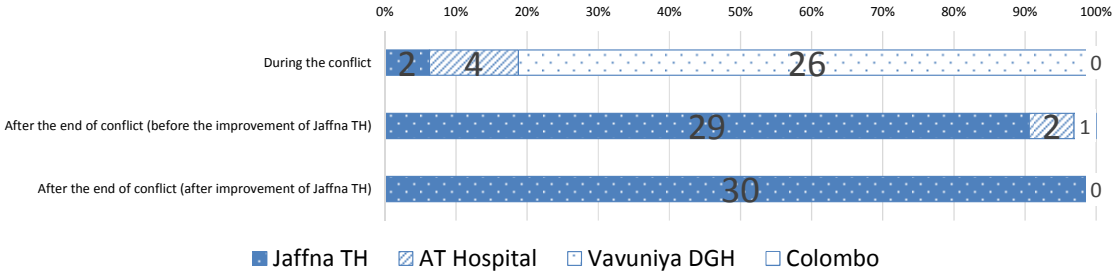


■Why did the frequency of visits to AT Hospital decrease after the end of the conflict? *(Multiple answers)*



<Survey at DGH Mullaitivu>

■Where did (do) you receive healthcare services in cases when you needed (need) advanced healthcare care services?
(During the conflict/After the end of conflict (before improvement of TH Jaffna)/After the end of conflict (after improvement of TH Jaffna)



Note: In fact, there were many cases referred or transferred to AT Hospital from DGH Vavuniya during the conflict period, thus patients that received healthcare at DGH Vavuniya during the conflict period may also be counted at AT Hospital.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

At the time of project planning, there was a negative impact on the environment. The existing drainage treatment plant was exceeding its capacity and drainage water that did not meet Sri Lankan quality standards was discharged to a lake. As a result, the burden on environment was identified .The project contributed to reducing its burden on the environment by constructing a new

wastewater treatment plant for drainage from the new building. Maintenance of the wastewater treatment plant is managed by an outsourced company, which maintains regular maintenance records. Thus, no environmental challenges have been observed.

Regarding medical waste disposal, waste is collected at the unit level such as at clinics, wards, and operation rooms, according to guidelines supplied by the infection control unit[46] of AT Hospital and is disposed under the unit's supervision. Therefore, no negative impact has been identified.

3.3.2.2 Land Acquisition and Resettlement

Land acquisition and resettlement were not required, as the project was an improvement of the existing AT Hospital facilities.

3.3.2.3 Contribution to Strengthening Function as a Teaching Hospital

As stated above, the AT Hospital's function as a teaching hospital has been strengthened by the improvement of the PU since in February 2012. Since the PU started functioning and hospital wards were improved, medical faculty students from Rajarata University could receive practical training at the PU wards. Practical training could also be conducted at the outpatient clinics because the Outpatient Department building was constructed and provided an improved environment for practical training[47]. Thus, the project has contributed to strengthening the functions of AT Hospital as a teaching hospital. It also can be said that the project indirectly contributed to human resource development of medical personnel as medical faculty students become medical doctors in the future after they graduate from Rajarata University.

3.3.2.4 Enhancement of Medical Staff Motivation

According to the questionnaire survey of medical staff, 85 percent responded that their work motivation increased due to the improvement of facilities and medical equipment through the project. The reasons described for enhanced motivation were "stress relief through the improvement of the work environment", "being able to provide appropriate medical treatment due to the improvement of facilities and medical equipment", and "the provision of private rooms". Although it was not part of the project, installation of an air conditioning system in the consultation room by the Sri Lankan side was a significant reason for increased work motivation and was pointed out by 14 staff members. In addition, the results of the questionnaire survey of outpatients also showed the satisfaction rate of medical staff performance improved greatly compared to before (refer to Box 2 in 3.2.2.2). Outpatients commented that staff were kinder than before, that their

[46] The unit in charge of surveillance of hospital infections, follow-up of infection control situations, and the development of infection control policies, etc.

[47] Interview with Rajarata University medical faculty students. 45 students (15 students/group × 3 groups), two groups in wards and one group in the outpatient department on rotation, received practical training at the time of the ex-post evaluation survey in January 2014.

services were more quickly than before etc. Therefore, it can be considered that the increased work motivation of medical staff through the project led to shifts in their performance at work.

3.3.2.5 Increasing Number of Non-Referral Patients

According to the interview with AT Hospital, the number of non-referral patients who visit AT Hospital directly without being referred from a lower-level hospital has increased due to the improvement of AT Hospital through the project. Although referral numbers from lower-level hospitals have not been recorded at AT Hospital, it is possible to assume from the results of the beneficiary survey that the referral system[48] is functioning to some extent (refer to Figure 2 below). However, there are many non-referral patients, such as in the walk-in clinic due to inadequate facilities of lower-level hospitals. In addition, there are cases where patients who received consultations at private hospitals come directly in order to receive consultations from the same consultants, as many consultants work both at AT Hospital and private hospitals. Also of concern, the counter referral system[49], in which patients in recovery after receiving treatment at an advanced healthcare hospital are referred back to lower-level hospitals, does not function properly[50].

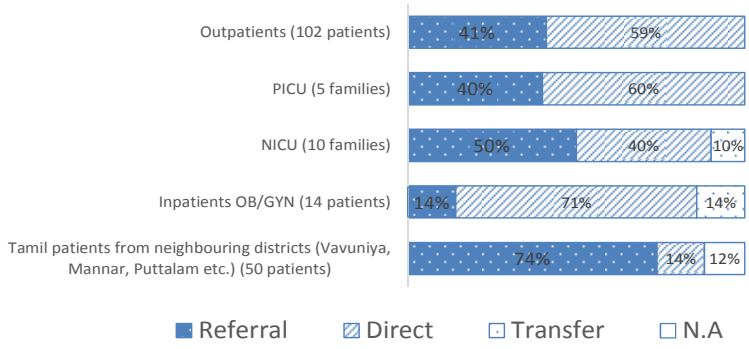


Figure 2 Mode of consultation according to AT Hospital patient questionnaire survey

As stated above, the number of outpatients and OB/GYN operations has increased, and the NICU bed occupancy rate has been improved by the implementation of the project. Indirect impacts through the project, such as enhancement of the AT Hospital Master Plan and improvement of Sri Lanka's health indices, have not been seen yet. The quality of healthcare services of AT Hospital has been improved through the project, and AT Hospital has been able to provide quality healthcare services to its catchment area and ex-LTTE controlled areas. It also has been identified that the project has contributed to enhancing the motivation of hospital staff in their work, as well as strengthening the function of AT Hospital as a teaching hospital.

Therefore, the project has largely achieved its objectives and its effectiveness and impact are high.

[48] System by which patients are not handled by lower-level hospitals and are referred or transferred to higher-level hospitals with advanced medical facilities.
[49] Process by which patients are referred back to a lower-level hospital from a higher-level hospital after they recover after receiving treatment using advanced medical facilities.
[50] Interview with AT Hospital and MOH staff.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

Details of the outputs of the project are shown in Table 6. Although there were minor changes of layout and specifications of medical equipment, these changes were appropriate[51].

Table 6 Planned and Actual Outputs

Planned			Actual	Changes from the plan
Construction of facilities				
Outpatients Department Building	Pent-house	Air conditioning machine area, elevated water tank, elevator machine room, electricity room	Almost as planned	-Extension of the connecting corridor to the new building -Pharmacy: Change of layout due to the revision of medicine control procedures in AT Hospital -Orthodontic: Change of layout so that consultants can see patients in a consultant room as AT Hospital purchased a dental unit and chair -PICU: Division of staff room for technical staff working night shift and for general staff -NICU: Installation of window connecting the operation room and intensive care unit in order to transfer new-born babies, and installation of a counselling room and storage room -Walk-in clinic: Installation of consultant room in injection room because of revised MOH policy to strengthen preventive medicine
	2nd floor	OB/GYN operations department, surgical sterilisation department, PICU, NICU		
	1st floor	Special outpatient department (internal medicine, ENT department, special dentistry, etc.), endoscopy department, physiology testing (electrocardiogram (ECG), electroencephalogram (EEG), etc.), laboratory		
	Ground floor	Emergency treatment unit, walk-in clinic, special outpatient department (surgery department, OB/GYN department, paediatrics department, etc.), pharmacy, reception		
Generator Room	1st floor	Electricity room	Almost as planned	-Moved construction location 5.9 metres in order to use hospital premises more effectively in the future.
	Ground floor	Power generation room, generator, automatic voltage regulator, main low-tension switchboard, automatic change-over switch, automatic generator starting panel, automatic synchronisation panel		
Wastewater Treatment Plant	-	Machine room, sedimentation tank, rotating-disk contact tank, sludge treatment facility, disinfection and discharge facility	As planned	
Main equipment（total 122 items）				
OB/GYN Operation Department		Anaesthetic machine, theatre lamp, patient monitor, theatre table, defibrillator with monitor, cautery unit, scrub-up sink, laparoscope set, hysteroscope, infant warmer, autoclave, patient bed, etc.	Almost as planned	-Change in specification of sterilising container set
Neonatal/Paediatric ICU		Ventilator with C-pap, ICU bed, incubator, patient monitor, syringe pump, phototherapy unit, infant warmer, defibrillator with monitor, blood gas analyser, mobile X-ray machine, etc.	As planned	None

[51] Interview with AT Hospital and MOH , and reference documents provided by JICA.

Outpatient Department	Spirometer, dermatology cautery unit, US scan (B/W), ENT microscope, ENT treatment unit, dental unit with chair, panoramic and cephalometric X-ray unit, endoscope, ECG monitor, emergency bed, patient monitor, infusion pump, spectrophotometer, microscope, tablet counting machine, electrical nerves stimulator unit, bone densitometer, electromyogram (EMG) machine, haematology analyser, interferential therapy unit, etc.	Almost as planned	-Addition of laboratory vacuum for micromotor -Change in specification of medicine cabinet -Change in specification of wooden bench for waiting area

Source: Reference document provided by JICA

The main outputs that were to be undertaken by the Sri Lankan side, such as demolition of existing buildings, land levelling, and exterior work, were carried out as planned without any significant delays[52]. Although it was outside of the project, an air conditioning system was installed in the consultation rooms of the outpatient clinics after the project by Sri Lankan funds in order to meet doctors' union demands.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual project cost borne by the Japanese side was lower than the planned cost. The total cost was 1,690 million yen [1,343 million yen (Phase I) and 347 million yen (Phase II)], which was 94 percent of the planned cost of 1,803 million yen[53]. The actual cost borne by the Sri Lankan side was 592 million Sri Lanka rupees (the conversion to yen is 445 million yen), which was higher than the planned cost of 573 million Sri Lankan rupees (431 million yen). The additional costs of the Sri Lankan side were due to excess exterior works and the installation of an air conditioning system in the outpatient clinics[54].

3.4.2.2 Project Period

The project period, from the start date of the detailed design survey up to the project completion, was 30 months, which exceeded the planned project period of 28 months (107 percent of the planned project period). This excess was due to the following main three reasons: (1) there were no bidders for contractors because of security concerns as the project target area was near the conflict-affected area; (2) it was necessary to divide the project into two phases comprising construction of buildings (Phase I) and instalment of medical equipment and remaining building

[52] Interview with the main consultants and MOH.

[53] The planned cost for the Japanese side was originally 1,803 million yen, which was the maximum grant for the Exchange of Notes. However, it was difficult for the project to implement all components planned within the maximum grant due to dramatic price increases. It was subsequently decided to divide the project into two phases: construction of the building (Phase I) and instalment of medical equipment and remaining building construction (Phase II). As a result, an additional Exchange of Notes was signed as Phase II, with an additional maximum grant of 390 million yen. (Reference document provided by JICA) As the additional Exchange of Notes was only signed after the project had already commenced, it is not factored in as part of the original planned cost. Thus, the maximum grant for the original Exchange of Notes (1,803 million yen) was regarded as the planned project cost.

[54] Although the planned cost was noted as 573 million Sri Lankan rupees (573 million yen) in the basic design study report, both the planned and actual costs were to be based on the exchange rate at the time of project completion in September 2010 (1 Sri Lankan rupee = 0.753 yen) to enable comparison between the planned and actual costs. The cost of installation of the air conditioning system, although not part of the project, was also included in the actual cost as its unit cost was not able to be confirmed.

construction (Phase II) due to drastic price increases; and (3) minor delays in construction work[55].

As seen above, although the project cost was within the plan, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The O&M system was established before the implementation of the project, and there were no changes at the time of ex-post evaluation. The O&M structural chart showing the interactions between the MOH and AT Hospital is shown in Figure 3 below.

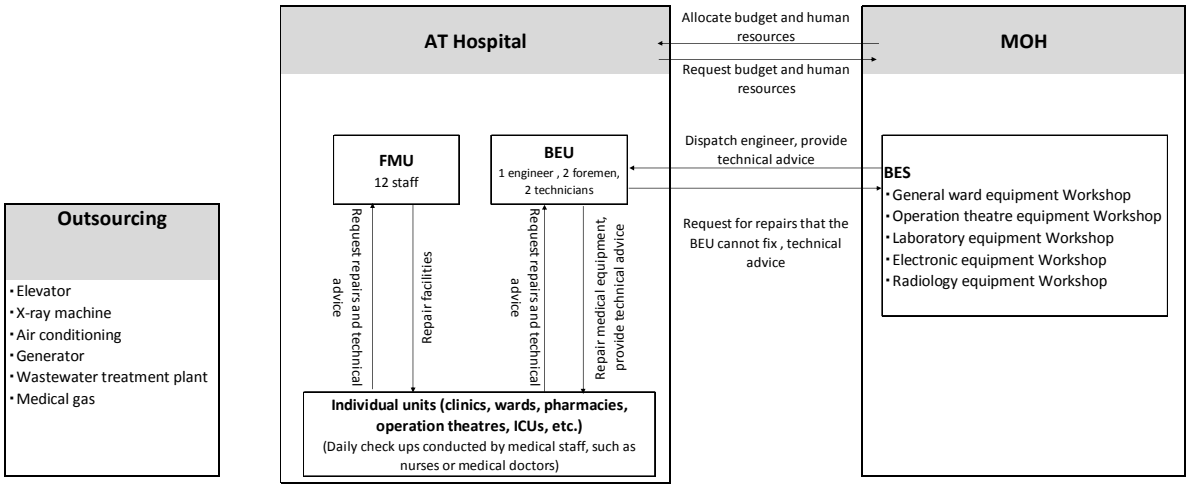


Figure 3 Structural chart of O&M at AT Hospital

The maintenance of the main facilities and some medical equipment is outsourced. O&M staff at AT Hospital belong to the Facilities Maintenance Unit (FMU), which maintains facilities, and the Bio-medical Engineering Unit (BEU), which maintains medical equipment. Although no major problems were identified related to daily maintenance, there are only 12 staff members in the FMU (the required number is 20), and two BEU foremen concurrently hold the post of technician as the BEU has only two technicians (the required number is four)[56].

The number of hospital staff[57] increased to 2,332 (as at February 2014) from 1,484 (as at 2006) as AT Hospital expanded its functions, such as by establishing the PU. Although it is difficult to secure personnel such as medical doctors, physiotherapists, pharmacists, electrocardiographers and midwives, as those specialities are in short supply throughout the whole of Sri Lanka[58], around 92

[55] Interview with main consultant.
[56] Interview with AT Hospital (overseer of FMU and engineer of BEU).
[57] Medical staff (consultants, medical doctors, nurses, paramedical staff, etc.) and operational staff (technical staff and ordinary staff).
[58] There are insufficient human resources such as medical doctors, nurses, physiotherapists, pharmacists,

percent of the required personnel of AT Hospital (2,536) were assigned at the time of ex-post evaluation[59].

Therefore, although there are insufficient staff numbers in some occupations, a basic O&M system has been established and it can be said that there are no major challenges from an institutional perspective.

3.5.2 Technical Aspects of Operation and Maintenance

Since almost all medical equipment procured by the project was renewal of old equipment, no clinics have reported having difficulty using medical equipment, according to responses to questionnaires given to each clinic. As for the O&M of medical equipment procured by the project, O&M manuals provided by the project at the time of completion of the project are referred to by Bio-medical Engineering Services (BES) in the MOH, and the BEU of AT Hospital, as needed. Repairs that require special technical skills and cannot be dealt with by the BEU or BES are outsourced. Thus, there are no major issues related to the technical aspects of O&M of medical equipment. However, it was noted by a BEU engineer that BEU staff need training for new medical equipment, as medical equipment is constantly updated and requires new knowledge.

Regarding the O&M of hospital facilities, maintenance of main facilities such as elevators, air conditioning systems, and wastewater treatment plants are outsourced. General facility maintenance other than those listed above, such as repairs to clogged water pipes, replacement of light bulbs, repairs to medical instruments like beds, and repairs to doors are done by the FMU. However, there are no technically skilled staff members in FMU, as general staff are appointed by the MOH and subsequently allocated to FMU. According to interviews with clinic, repairs that are routine for FMU staff, such as repairing malfunctioning doors, sink leaks, and toilet blockages, are unable to be completed at times due to the lack of technical skills. Although provision of technical training for FMU staff is the responsibility of AT Hospital, technical training is rarely conducted due to insufficient budget. Therefore, there are challenges related to the technical aspects of O&M[60].

3.5.3 Financial Aspects of Operation and Maintenance

AT Hospital expenditures for O&M are all covered by budget allocations from the MOH, as all public healthcare services are available to all citizens free of charge in Sri Lanka. Actual expenditures of the MOH and AT Hospital have increased year by year from 2006, the year that AT

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electorocardiographers and midwives in Sri Lanka. According to interviews with MOH staff, the MOH invests in securing new human resources. For instance, the MOH tried to conduct interviews with recent graduates from advanced level exams for recruitment into paramedical schools for nursing, physiotherapy, medical laboratory science, pharmaceutics, medical research, etc. This enabled the MOH to secure between 150 and 2,000 medical personnel per occupation per year, but outflow of human resources from the country presents an ongoing problem.

[59] Only around 75 percent of required personnel of AT Hospital (1,980) were assigned in 2006 (based on analysis from the basic design study report).

[60] The MOH gave the example of District General Hospital Ampara (DGH Ampara) as demonstrating good practice by providing FMU staff technical training. DGH Ampara provided technical training to their FMU staff through a technical school located near the hospital.

Hospital was upgraded to a teaching hospital. It can be determined that the appropriate budget for O&M for a teaching hospital has been secured for AT Hospital since 2009, as the percentage of AT Hospital expenditures from the MOH budget was stable (refer to Table 7). According to an interview with MOH, appropriate budget will be allocated to AT Hospital from the MOH budget in the future as budget allocation is based on the actual expenditure from the previous year. Additional medical equipment maintenance costs can also be requested to BES by the BEU in cases where medical equipment maintenance expenditures exceed the AT Hospital budget. Although this procedure usually takes time and causes delays in the actual repair, no significant issues have been identified that interfere with O&M[61]. Therefore, it can be said that the minimum essential budget for O&M is secured.

Table 7 Actual expenditure of the MOH and AT Hospital

(Units: thousand Sri Lankan rupees)

	2006	2007	2008	2009	2010	2011	2012	2013
MOH	37,481,726	49,584,482	46,898,023	48,975,888	53,096,550	64,816,004	68,060,192	75,088,404
AT Hospital	549,632	758,316	820,542	1,080,650	1,136,815	1,255,160	1,511,240	1,808,102
Actual expenditure related to O&M at AT Hospital								
Personnel	391,373	576,544	641,987	803,279	830,458	929,747	1,134,129	1,331,330
Medical equipment and facility maintenance	11,224	17,171	15,225	19,279	17,890	23,829	31,579	23,811
Electricity, water	59,657	51,054	47,032	97,809	97,854	93,797	90,310	139,132

Source: Document provided by the MOH and questionnaire responses from AT Hospital
Note: Rupees were rounded down to the thousand in the AT Hospital expenditure table above.

3.5.4 Current Status of Operation and Maintenance

According to the results of the questionnaire survey of each clinic, although O&M of facilities and medical equipment procured by the project are being undertaken properly, there were some minor issues. As for O&M of major medical equipment, the malfunction of a blood gas analyser provided to the PICU, and defects in the window panels of incubators provided to the NICU, were identified. AT Hospital is considering purchasing a new blood gas analyser because it is more cost efficient to replace it with a new model than to repair it as the cost of repair and consumable of current model is higher than the new model[62]. The replacement of the incubator window panels was delayed due to difficulty in finding the required spare parts. This is because the supplier that was appointed as a local agent at the time of medical equipment provision discontinued their service. However, it was identified in the second field survey that the BES has ordered the spare part for the window panel from a new appointed supplier and is awaiting delivery after inquiring with the main contractor for medical equipment procurement.

[61] Interview with BEU.
[62] However it is also considered that the reason for increasing repair costs was that AT Hospital did not prepare a contract for annual maintenance services, which was recommended at the project planning stage. According to the BEU, repair costs and consumables are free of charge or inexpensive during the warranty period when the new model is purchased.

Regarding O&M of facilities, the infectious room in the PICU is utilised as storage space for broken medical equipment and not for its original purpose[63]. Other issues identified were the malfunction of clinic doors, water leaking from sinks, and blockages in patient toilets. Wooden shelves attached under sinks have been damaged by leaking water and are unable to be used for storage in most clinics. In addition, it has been observed that roof tiles of the Outpatient Department building are in disrepair due to monkeys.

As stated above, some problems have been observed in terms of institutional and technical aspects of O&M and current status. Therefore, sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project, the improvement of facilities and medical equipment in the Outpatient Department, OB/GYN Operation Department, the PICU and the NICU at AT Hospital, was implemented in order to enhance quality healthcare services for the residents of the AT Hospital catchment area.

The relevance of this project is high as it is consistent with the national development policy and needs of Sri Lanka both at the time of project planning and the time of ex-post evaluation, as well as with Japan's aid policy at the time of project planning. After the project, the number of outpatients and number of OB/GYN operations have increased, and the bed occupancy rate of the NICU has improved. Furthermore, the level of patient and medical staff satisfaction was found to be high. AT Hospital staff have become more efficient in their work and the quality of healthcare services has improved after the project. Thus, it can be concluded that the project has produced a sufficient effect. In addition, this project has contributed to the enhancement of AT Hospital's function as a teaching hospital, and to the provision of quality healthcare services to its catchment area and ex-LTTE-controlled areas as the tertiary hospital in North Central Province. Taking this into consideration, the effectiveness and impact of the project are high. The efficiency of the project is fair as project costs were within the plan, while the project period exceeded the plan. In terms of O&M, the O&M system was established and the minimum budget was continuously secured, but there are some challenges regarding the technical skills of O&M staff. Therefore, the sustainability of the project effect is fair.

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

4.2 Recommendations

4.2.1 Implementing Agency

<AT Hospital>

4.2.1.1 Strengthening of the O&M System

Through the implementation of the project, AT Hospital has strengthened its function as a top

[63] This is because of insufficient space for storing malfunctioning ventilators that were procured by the MOH, not the project.

referral health facility in North Central Province and has come to play the important role of providing advanced healthcare services in the area. Although there are some challenges regarding FMU staff skills, basic O&M of facilities and medical equipment is currently taking place. However, facilities and medical equipment are repaired only when issues are identified. Daily inspections and preventive maintenance are not currently being undertaken by BEU and FMU. To undertake daily inspections and preventive maintenance, the appointment of more O&M staff by the MOH is required. At the same time, AT Hospital is expected to take measures to improve FMU staff skills as much as possible within their limited budget, such as by strengthening proper handover of FMU duties between predecessor and successor, and sending at least one FMU staff member to technical training who can then transfer knowledge to other FMU staff.

4.2.1.2 Restore Proper Use of PICU Infectious Rooms

Storage space is essential for the PICU because of its requirement for a large quantity of medical equipment. Currently, the infectious rooms provided by the project are utilised as storage rooms for broken medical equipment. AT Hospital should remedy this situation immediately as the accommodation of infectious patients in general rooms together with non-infectious patients leads to the risk of infection. When this issue was pointed out to AT Hospital during the second field survey of the ex-post evaluation, the hospital recognised the importance of this issue and its urgency. Therefore, it is expected that AT Hospital will take appropriate action to secure the infectious room by identifying other storage space for broken equipment or considering its disposal.

4.2.1.3 Keep Records for the Number of Referrals

The results of the beneficiary survey indicated that the referral system is functioning to some extent. However, the amount of patients arriving directly without referral letters has increased due to the improvement of AT Hospital by the project. This is because facilities at some lower-level hospitals remain unimproved, and because some consultants work at both AT hospital and private hospitals[64]. However, it is difficult to ascertain the specific details as there are no records of the number of referrals. Keeping track of the number of referrals would be the first step in understanding the current situation in order to enhance the referral system (including counter referrals), and it is important for AT Hospital to strengthen cooperation with lower-level hospitals.

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4.2.1.4 Capacity Development of O&M Staff

O&M of the main facilities and medical equipment of AT Hospital are outsourced. FMU staff undertake other minor tasks that are not outsourced, such as repairs to clogged water pipes. However, having skilled staff in facility maintenance is essential to AT Hospital in order to

[64] Patients who receive consultation at private hospitals come to AT hospital in order to receive consultation from the same consultants for free.

implement periodical check-ups and appropriate maintenance. Currently, most FMU staff do not have sufficient technical skills in facility maintenance, as they are appointed as general staff and allocated to FMU. Provision of technical training to FMU staff is the responsibility of AT Hospital, however, it has seldom been provided due to insufficient budget. To make matters worse, there is also the challenge of staff reassignment. Even if staff were provided technical training or on-the-job training at a particular hospital, they are not necessarily allocated to the FMU at another hospital when transferred. They are usually appointed as general staff across several units. This situation makes it difficult for FMU staff to handover technical skills. Thus, the challenge of insufficient skills of FMU staff will also continuously be a challenge for other hospitals. In order to strengthen sustainable facility O&M, the MOH is expected to take action to overcome this challenge, such as through the appointment of at least one technical staff member to the FMU at each hospital. In addition, it is recommended that O&M training for medical equipment be conducted by the MOH for BES staff, in case new medical equipment is procured.

4.2.1.5 Strengthening of Medical Human Resources

AT Hospital faces the challenge of insufficient personnel in some specialities as Sri Lanka has insufficient medical human resources such as medical doctors, nurses, physiotherapists, pharmacists, electrocardiographers and midwives. Strengthening of human resources is expected in the future because the MOH is currently putting efforts into enhancing recruitment of new medical personnel. The MOH is expected to continue to invest in securing medical human resources, as well as their continuous development. It is recommended that the MOH further appoint medical personnel according to AT Hospital requests. Furthermore, an O&M system for handling daily maintenance has been established, but the current number of O&M staff is insufficient to carry out periodical check-ups and preventive maintenance work. Thus, the MOH also needs to consider strengthening human resource development of technical personnel of O&M and the securement of those personnel.

4.2.1.6 Close Communication with Manufacturer and Local Agent Suppliers

It was identified that the replacement of incubator window panels was delayed due to difficulties in finding spare parts because the supplier that was appointed as a local agent at the time of the original provision of the medical equipment discontinued their service. Although this problem has been resolved by BES by requesting that the main contractor of the project introduce a new appointed supplier, it is important for efficient O&M that the MOH monitors the condition of local agent suppliers. In order do to this, it is recommended that close communication between the MOH and local agent suppliers be maintained regularly, instead of only when equipment needs repairing.

4.2.2 Recommendations to JICA

There is no particular recommendation to JICA.

4.3 Lessons Learned

4.3.1 Good Practice of Maintaining Quality of Healthcare Services as a Tertiary Hospital

AT Hospital's practice of reducing the frequency of patient visits by adjusting next consultation intervals depending on the severity of the patient's condition has contributed to enhancing the effectiveness of the project. As stated above, the referral system is functioning to some extent at AT Hospital. However, the incidence of patients with mild conditions that could receive consultation at a lower-level hospital arriving without a referral letter has increased after the improvement of the outpatient clinics through the project. To prevent overcrowding in outpatient clinics, AT Hospital began in 2011 the practice of adjusting next consultation intervals from one month to two months, depending on the patient's condition. Although the total number of outpatients has tended to increase year by year, AT Hospital can maintain its quality of healthcare services by preventing overcrowding. Ideally, advanced health facilities, such as AT Hospital, should concentrate on caring for patients with serious conditions, but it is understandable from the patient psychological perspective that they prefer better hospitals. Under these circumstances, this practice is a good example of a service provider that is a tertiary hospital making efforts to maintain the quality of healthcare services by placing restrictions in order to give priority to patients who need advanced healthcare.

Therefore, this good practice is applicable to similar projects in other countries in which referral systems are not functioning well and where it is expected that the number of non-referral patients with mild conditions will increase after the implementation of the project. Such practices would be instrumental in enhancing and maintaining the effectiveness of the project. Furthermore, in cases where similar projects are implemented in other countries in which lower-level hospitals are improved to some extent, prior discussion with the implementing agency about measures that allow the target tertiary hospital to prioritise to ensure provision of advanced healthcare services after the project, such as strengthening the counter referral system, is essential.