

Tonga

Ex-Post Evaluation of Japanese ODA Grant Aid Project
“The Project for Upgrading and Refurbishment of Vaiola Hospital”

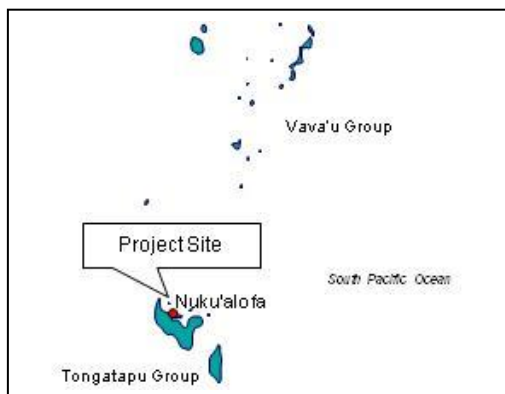
External Evaluator: Keisuke Nishikawa
Ernst & Young Advisory Co., Ltd.

0. Summary

The Government of Tonga is aiming to improve medical care services in the country as a national policy. This project to support the upgrading and refurbishment of Vaiola Hospital, the only hospital providing advanced medical care services in the Kingdom of Tonga, is consistent with such policy. As for project implementation, in spite of slight changes, the outputs, the cost and the period of the project were in line with the original plan. Although the achievement levels were lower than initially targeted figures, domestic demand for medical care services was fully met and these services generally became more effective and safer, resulting in improved credibility and higher satisfaction in regard to the hospital. With respect to sustainability, while steady progress has been made in institutional strengthening and the operation & maintenance (O&M) budget, there are still some issues to be tackled in terms of technical skill levels and human resources in the maintenance division.

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

1. Project Description



Project Location



Hospital Building Developed by the Project

1.1 Background

Vaiola Hospital is the only hospital providing advanced medical care services in Tonga. It is the top referral hospital and provides primary health services to the residents of Tongatapu Island, the largest island of the country.

However, the following issues were recognised as negatively impacting the provision of medical

care services at the hospital due to the aging of facilities since its establishment in 1971.

- Departments related to the Clinical Service Building (CSB) were dispersed, resulting in inefficient operations.
- Shortage of operating theatres and ambiguity in demarcation between clean operating theatres and dirty zones increased the risk of infection.
- Recovery beds for post-operative patients or patients in the Intensive Care Unit (ICU) were insufficient.
- Sterilisers in the Central Sterile Supply Department (CSSD) were often not functioning, and the capacity of sterilising equipment was insufficient.
- The X-ray unit often broke down hindering proper diagnoses.
- The existence of open-type septic tanks without lids having insufficient capacity, and related environmental issues, such as the spreading of pollutants.

Due to such conditions, the Kingdom of Tonga, with the support of the World Bank, developed the “Master Plan for the Redevelopment of Vaiola Hospital” with the goal of comprehensive hospital improvement. The master plan proposed the implementation of a six-phase redevelopment plan involving new construction and refurbishing activity with support from donors. This project was implemented in consideration of the importance of the environment surrounding the medical care services of Vaiola Hospital to enable provisions of standard medical care services by addressing the aforementioned problems.

1.2 Project Outline

The objective of this project is to improve Vaiola Hospital’s medical care services by upgrading and refurbishing its medical facilities and equipment, thereby contributing to the overall improvement of medical care services in the Kingdom of Tonga.

| | |
|-----------------------------------|--|
| Grant Limit / Actual Grant Amount | 1,030 million yen / 1,027 million yen |
| Exchange of Notes Date | August 31, 2004 |
| Implementing Agency | Ministry of Health The Kingdom of Tonga |
| Project Completion Date | February 21, 2006 |
| Main Contractor(s) | Fujita Corporation (Construction) NBK Corporation (Procurement) |
| Main Consultant(s) | Kume Sekkei Co., Ltd. |
| Basic Design | October 2003 – March 2004 |
| Related Projects | [Technical cooperation] Tonga, Japan/WHO Joint Health Laboratory Project (1981-1986) |

| | |
|--|---|
| | [Grassroots Grant Aid] Vaiola Hospital Public Health Laboratory Building Project (1983) Vaiola Hospital Ultrasound and Blood Bank Building Project (1995) [Other Donors] World Bank: Health Sector Support Project (2003-2008) AusAID: Tonga Health Sector Planning & Management Project (1999-2007), etc. |
|--|---|

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa (Ernst & Young Advisory Co., Ltd.)

2.2 Duration of Evaluation Study

Duration of the Study: November, 2010 – November 2011

Duration of the Field Study: March 28 – April 9, 2011, and June 14 – June 18, 2011

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of the Kingdom of Tonga

At the time of project planning, Tonga set forth “the achievement of the improvement of quality of life” as a long-term objective for 2025 in its “Seventh National Development Plan.” As shown by the following slogan expressing the explicit goal, “the establishment of a health system which Tongans can be proud of by 2020,” the Tongan government aimed to provide sufficient and qualified health care services. Also, as part of a policy outline for the health sector, it prepared guidelines for nine areas including efficiency improvements in operational management of the Ministry of Health, strengthening and improvement of staff management of the Ministry, upgrading of medical facilities and equipment, and better O&M of facilities and equipment to promote the development of the appropriate environment for health care services. As part of these efforts, “the Master Plan for the Redevelopment of Vaiola Hospital” was developed in 2002 with the support from the World Bank (WB), and subsequently all upgrading and refurbishing phases were to be completed by 2011.

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ②: Fair, ①: Low

Tonga's active efforts to improve the indicators of the Millennium Development Goals (MDGs) have brought certain progress, such as greater capabilities to control infectious diseases. With the increasing trend of lifestyle-related diseases such as diabetes, hypertension, and obesity considered, the current "National Strategic Planning Framework" announced in 2010 sets forth the improvement of Tongans' health through minimizing non-infectious diseases as the basic objective. In addition, "Ministry of Health Corporate Plan 2008/09 – 2011/12," the implementation plan for the framework, sets forth the continuation of upgrading of facilities and IT system of the Ministry as one of the six major output areas. As one of the specific strategies, completion of all phases of upgrading and refurbishing of Vaiola hospital is clearly indicated.

Therefore, further development of health care services is regarded as important in securing Tongan's quality of life through the improvement of the health of these citizens, and the master plan for this purpose has been developed and implemented. This project was developed to contribute to the realisation of a part of the master plan, and was consistent with the development policy and programmes of the Government of Tonga.

3.1.2 Relevance with the Development Needs of the Kingdom of Tonga

Vaiola Hospital has been the top referral³ hospital in the country serving more than 100,000 people as well as the primary health services provider for the residents on Tongatapu Island, in which approximately 70% of the population reside. Currently, community-based medical care services are provided through improved Health Centres located in various places. Many people, however, use Vaiola Hospital – located in the capital of Nuku'alofa – to seek primary health care services due to its easy access. While the quality of the services is improving, non-infectious lifestyle diseases such as diabetes, hypertension, and obesity have also been increasing in recent years. Thus, the hospital is now required to address these needs.

However, because of aging facilities, various problems had been identified at the hospital, including:

- CSB-related departments placed in inconvenient locations
- Lack of operating theatres
- Greater risks of infection due to ambiguity in the demarcation between clean and contaminated zones
- Shortage of beds for post-operative patients or patients in ICU
- Lack of sterilising capacity in CSSD due to repeated equipment break-downs
- Problems with X-ray equipment that affected proper diagnoses
- Lack of septic tank capacity and related pollution risks due to design of septic tanks

Urgent action was required to solve these problems as Vaiola Hospital was positioned as the top referral hospital in Tonga.

³ Referral: A system in which regional health centres introduce their patients to advanced medical institutions according to the disease conditions of the patients

A number of hospital functions have been improved by this project, but because of its continued significance as the provider of primary health care services and the top referral hospital, other remaining facilities and equipment, which were not within the scope of this project, were also in need of further improvement. To address this, the WB implemented a subsequent phase to the project. Currently, Japan International Cooperation Agency (JICA) is undertaking Phase 2 of the Project for Upgrading and Refurbishment of Vaiola Hospital⁴ as the final phase of the entire project.

3.1.3 Relevance with Japan's ODA Policy

In “The Okinawa Initiative: Regional Development Strategy for a More Prosperous and Safer Pacific” adopted in the Third Japan-PIF Summit Meeting (PALM 2003) in May 2003, Japan announced that enhanced security, a safer and more sustainable development, improved education and human resources development, better health, and more robust and sustained trade and economic growth were the priority policy objectives for Pacific Island countries. Japan, accordingly, prioritised the following 5 areas for Tonga: 1) human resource development, 2) local health improvement and national health promotion, 3) rationalization and improvement of public services, 4) sustainable use of resources and environmental conservation and 5) economic growth. This project falls under “2) local health improvement and national health promotion” and is consistent with the aid policy of Japan of the time.

This project was also consistent with the master plan for the overall improvement of Vaiola Hospital as previously mentioned. Thus, it can be said that this project was aligned with the overall policy directions for government aid and was complementary with other projects.

This project has been highly relevant with Tonga's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

As part of the overall improvement of Vaiola Hospital, a CSB including operating theatres and an X-ray room, obstetrics and surgical wards, and septic tanks were constructed, and associated equipment and materials were procured for this project.

Tables 1 and 2 show comparisons of the final outputs and the original plan.

⁴ The second phase project includes construction of an outpatient building and an annex and a dental ward (outpatient and special outpatient departments; a pharmacy; pre-delivery check, ophthalmology, diabetes, physiotherapy and dental departments; an education and seminar department; administrative department; a school of nursing; a mortuary; a wastewater treatment plant (septic tank machine room), water and rainwater tanks) and procurement of equipment and materials for newly added and existing facilities. Scheduled to be completed in March 2012 (Total project cost: 2.128 billion yen, of which Japan's contribution: 1.998 billion yen).

Table 1: Comparison of the Original Plan and the Actual Outputs (Building)

| Department | Original Plan | | Actual Outputs | |
|------------------|--|--|--|--|
| | Floor Area (planned m2) | Description of Facilities | Floor Area (actual m2) | Description of Facilities |
| CSB | GF (918.0) | Radiology; Blood Bank; Laboratories; Biomedical Equipment Workshop; Inpatient Pharmacy | GF (918.0) | Radiology; Blood Bank; Laboratories; Biomedical Equipment Workshop; Inpatient Pharmacy |
| | 1F (864.0) | ICU (2 beds), Recovery Beds (3 beds); Operating Theatres (2 rooms); Day Surgery Reception (1 room), Central Sterile and Supply | 1F (864.0) | ICU (2 beds), Recovery Beds (3 beds); Operating Theatres (2 rooms); Day Surgery Reception (1 room), Central Sterile and Supply |
| Ward Building | GF (992.3) | Obstetrics Ward (34 beds + SCN 6 cots), Delivery Suites (6 beds) | GF (992.3) | Obstetrics Ward (34 beds + SCN 6 cots), Delivery Suites (6 beds) |
| | 1F (748.1) | Surgical Ward (40 beds) | 1F (748.1) | Surgical Ward (40 beds) |
| Covered Corridor | GF, 1F 234.1 m2 | | GF, 1F 232.9 m2 | |
| Septic Tanks | Sufficient capacity to deal with the existing facilities (600 persons x 3) | | Sufficient capacity to deal with the existing facilities (600 persons x 3) | |

Table 2: Comparison of the Original Plan and the Actual Outputs (Equipment)

| Department | Original Plan | Actual Outputs |
|-------------------------------|--|--|
| Operating Theatre | Operating Light, Operating Table, Anaesthesia Apparatus with Ventilator, Electrosurgical unit, Patient Monitor, Surgical Scrub Station, Operating Microscope for ENT, Defibrillator, Ophthalmic Surgical Equipment | Operating Light, Operating Table, Anaesthesia Apparatus with Ventilator, Electrosurgical unit, Patient Monitor, Surgical Scrub Station, Operating Microscope for ENT, Defibrillator, Ophthalmic Surgical Equipment |
| CSSD | High Pressure Steam Steriliser, Table-Top Ultrasonic Washer | High Pressure Steam Steriliser, Table-Top Ultrasonic Washer |
| ICU | Ventilator for Adult and Paediatric, Patient Monitor | Ventilator for Adult and Paediatric, Patient Monitor |
| Laboratories | Blood Cell Counter, Safety Cabinet | Blood Cell Counter, Safety Cabinet |
| Blood Bank | Blood Bank Refrigerator | Blood Bank Refrigerator |
| Inpatient Pharmacy | Medical Refrigerator, Distilled Water Unit | Medical Refrigerator, Distilled Water Unit |
| Biomedical Equipment Workshop | Maintenance set | Maintenance set |
| Radiology & Ultrasound | X-Ray Unit, Automatic Film Processor, Ultrasound Scanner B/W | X-Ray Unit, Automatic Film Processor, Ultrasound Scanner B/W |
| Obstetric Ward | Doppler Fetal Heart Rate Detector, Bedpan Sanitiser | Doppler Fetal Heart Rate Detector, Bedpan Sanitiser |
| Delivery Room | Fetal Monitor (CTG), Delivery Table, Delivery Light | Fetal Monitor (CTG), Delivery Table, Delivery Light |
| Special Care Nursery | Baby Resuscitation Trolley, Infant Incubator | Baby Resuscitation Trolley, Infant Incubator |
| Surgical Ward | Traction Apparatus with Bed, Pulse Oximeter | Traction Apparatus with Bed , Pulse Oximeter |
| Other (equipment) | Oxygen Condensing System | Oxygen Condensing System |

As is shown in the above tables, the project was implemented mostly in accordance with the

original plan. As for the facilities, although the area of the covered corridor turned out to be slightly smaller than the originally planned figure, there seemed to be no problems arising from this modification. According to the implementing agency, equipment was procured as planned, and its existence was confirmed during the field study visits.

Changes not shown in the above tables include the installation of fire doors and emergency stairs, and the widening of the doors of patient rooms. There were also minor works such as the installation of a door between laboratories and the blood bank, and a window to the wall of the inpatient pharmacy. These changes were added to fully comply with the building code⁵ or the comprehensive design; no negative impacts on the overall plan were found and, in terms of the fire prevention measures, the changes brought additional benefits. As for the septic tanks, the bottom slab was set higher than the original design as groundwater flowed out during the excavating work, and the length and the width of the slab was increased to adequately secure the intended capacity.

Inputs by Tonga, including the upgrading of electric power receiving facilities, installation of a telephone trunk line, developments of roads and a parking lot on the premises, connecting the sewage pipes, transferring of the existing medical equipment, procurement of furniture and furnishings, and gardening and planting work, were all delivered as planned.



Photo 1: Nurse Station in Obstetrics Ward



Photo 2: Surgical Ward

3.2.2 Project Inputs

3.2.2.1 Project Cost

Originally the project was expected to cost 1,030 million yen (JICA's component). The actual amount spent was 1,027 million yen (99.7% compared to the original amount), slightly lower than planned. Plans were for the total project cost to be 1,137 million yen, including a Tongan component of 107 million yen. The actual total project cost, however, was not determined due to the lack of information on the actual spending by Tonga. Thus, a comparison of the originally

⁵ The Building Code and the Regulations were officially approved in Tonga in 2002 and July 2007, respectively.

planned total cost and the actual total cost was not possible. However, it can be estimated that the planned amount was disbursed as all the planned inputs from Tonga were delivered as mentioned above.

3.2.2.2 Project Period

Although the project period⁶ was estimated to be 20 months in total (5 months for design and 15 months for construction), the project was completed in 18 months (3 months (September to November 2004) for design and 15 months (December 2004 to February 2006) for construction), shorter than the planned period (90%). A highly efficient design phase contributed to the early completion of the project.

Both the project cost and the project period were as planned, therefore efficiency of the project is high.

3.3 Effectiveness⁷ (Rating: ③)

3.3.1 Quantitative Effects

The project was expected to result in increases in the number of operations, X-ray examinations, higher sterilisation volumes, and the realisation of in-house ophthalmic operations. The following table compares the effects expected at the time of planning and the actual effects in post-project years.

Table 3: Changes in Quantitative Indicators

| Indicators (Annual) | Original Plan | | Actual Output | | | |
|---|-----------------------------|---------------------------------------|------------------------------|-----------|-----------|-------|
| | Base year (2002) | 3 years after completion (2009) | 2006 (Completion year) | 2007 | 2008 | 2009 |
| Number of Operations | 2,985 | 3,300 | 1,921 | 1,868 | 2,763 | 2,702 |
| Number of Ophthalmic Operation (Cataracts) | 0 (unable to conduct) | 104 | 84 | No record | No record | 45 |
| Number of X-ray Exams | 9,504 | 10,500 | 8,223 | 8,608 | 8,827 | 9,456 |
| Sterilisation volume (litres/day) | 1,760 | 2,640 or more | 2,711 | 2,605 | 2,418 | 2,512 |

Source: Data provided by the Ministry of Health (extracted from Health Information System etc.)

In 2009, all indicators were below what had originally been anticipated; numbers of operations and X-ray examinations, in particular, were even lower than the data of 2002. On the other hand,

⁶ The project period is defined as “design period + construction period.”

⁷ The evaluation result of the project impacts is incorporated into the Effectiveness rating.

the annual changes of these indicators have shown an increasing trend in subsequent years. At the time of project completion, it seemed that some non-urgent operations had been postponed as the hospital needed a lot of time to move the equipment from the old facilities and to consolidate the new operational structure. As can be seen in Table 4, there has been considerable fluctuation in the numbers of outpatients at Vaiola Hospital and in the Tongan population in recent years; no significant increases have been noted. Thus, it can be said that Vaiola Hospital has not had any major problems in providing medical care services and that the patients' needs were satisfactorily met⁸. Although the actual data have not reflected the figures expected at the time of planning, the project can be judged as sufficiently effective.

Table 4: Number of Outpatients at Vaiola Hospital and the Total Population of Tonga

| | 2006 | 2007 | 2008 | 2009 |
|--|--------|--------|--------|--------|
| Number of outpatient of Vaiola Hospital (person) | 53,839 | 45,667 | 66,625 | 52,209 |
| Population of Tonga (thousand persons) | 102.4 | 103.3 | 102.3 | 103.1 |

Source: Data provided by the Ministry of Health (the number of outpatients) and the Annual Report (population)

As for the sterilisation volumes, a slight delay in treatment was discovered since one of the two large sterilisers procured in the project was not working properly. Despite this breakdown, the hospital has not faced any major troubles. Vaiola Hospital intends to replace the broken steriliser with a new one in FY2011 to avoid any situations where operations cannot be conducted due to a breakdown or malfunction of the other/remaining steriliser.

3.3.2 Qualitative Effects

The following points were listed as qualitative effects of the project.

- (1) Pregnant women can be hospitalised prior to delivery, which was previously impossible due to the shortage of beds.
- (2) Integration of scattered CSB functions improves the efficiency of medical care services.
- (3) Installation of radiation-proof wall to the radiology room decreases the technicians' level of exposure to radioactive substances; upgrading of X-ray equipment enables more efficient and precise diagnoses.
- (4) Clear distinction between contaminated and non-contaminated areas decreases the risk of infections in the hospital.

The number of beds in the obstetrics ward increased from 26 to 34, which enabled pregnant women to be hospitalised before the delivery according to their needs, but it still seemed that the number of beds was still not sufficient. The bed occupancy rate in the year of 2009 was 84%, four

⁸ Numbers of patients with untreatable symptoms at Vaiola Hospital and transferred to other hospitals overseas were 36 in FY2007/08, 47 in FY2008/09, and 25 in FY2009/2010. Various medical care services are now being provided in Tonga.

months of which utilisation was over 100%. One of the reasons was the fact that 98% of pregnant women delivered their babies at hospitals in that year, which was the result of Tongan government's health policy to encourage hospital deliveries. In addition, there was an increase in the rate of pre-delivery health checks of pregnant women, which might be considered as a sign of improvement in the hospital's credibility and greater awareness of the importance of getting treatment at medical institutions.

As for the improved efficiency of medical services, positive comments from stakeholders were obtained: the integration of the inspection room, the radiology unit, and the operating theatres, which used to be in different buildings, into CSB promoted the operational efficiency; the radiology unit was widened with a newly-installed wall so that the safety of technicians is seen as having significantly improved. The beneficiary survey⁹ showed that 72% of the respondents, comprised of doctors, nurses, and other staff felt that the treatment and X-ray inspections at the hospital were more effective.

Table 5: Change in the Effectiveness of Medical Services
by Integrating Several Functions into One Building

| [Question] Have medical treatments and X-ray inspections become more effective than before? (73 respondents) | Much more effective | More effective | Same | Not really improved | Worse |
|---|---------------------|----------------|-------|---------------------|-------|
| | 13.7% | 57.5% | 23.3% | 2.7% | 2.7% |

In order to reduce in-hospital infection risks, clean and contaminated zones are now clearly indicated, and the Infection Control Team was established internally to raise awareness of the relevant hospital staff. The beneficiary survey with the hospital staff has shown that 78% of the respondents recognised the reduction of such risks after the project. It should be stressed that it is not only the new facilities but also the establishment of Infection Control Team that contributed to the improvement of separating clean and dirty zones.



Photo 3: Signboard clearly indicating dirty and clean zones

Table 6: Change in the Awareness of the In-hospital Infection Risks

| [Question] Has the reduction of the risk of 'in-hospital infection' been achieved through the separation of clean and contaminated zones in the operating theatre & CSSD? (77 respondents) | Achieved significantly | Achieved | Same | Not really achieved | Worse |
|---|------------------------|----------|-------|---------------------|-------|
| | 23.4% | 54.5% | 16.9% | 3.9% | 1.3% |

⁹ The beneficiary survey was conducted through questionnaires/interviews with doctors, nurses, and staff of the hospital, 79 in total, and 22 patients hospitalised both in the old and new wards. These individuals were asked about the facilities and equipment, improvement of medical services, utilization and maintenance of facilities and equipment, but some questions differed between hospital staff and ex-inpatients.

Based on the above results, this project has largely achieved its objectives, therefore its effectiveness is high.

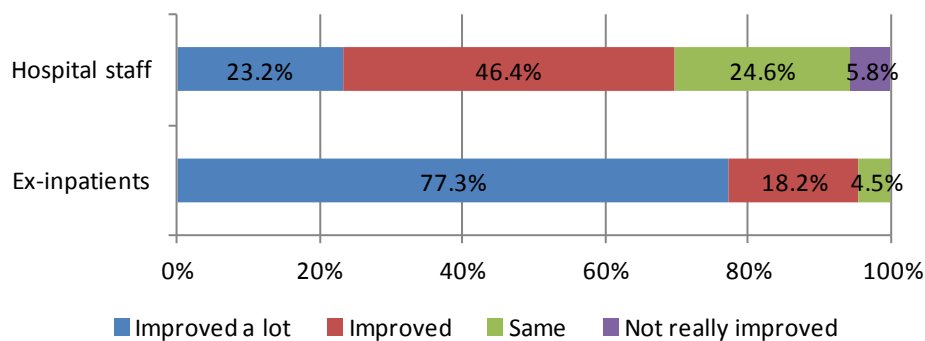
3.4 Impact

3.4.1 Intended Impacts

The improvement of facilities and equipment of Vaiola Hospital through this project was expected to contribute to an improvement of the hospital's credibility by reducing the risks of in-hospital infection, and a decrease in the infant and maternal mortality rates was also expected.

3.4.1.1 Improvement of the Hospital's Credibility

According to the interviews with the hospital staff, the credibility of the hospital seemed to have improved as a result of the awareness raising activities: the majority of the visitors are now visiting the inpatients during designated hours; they have also refrained from bringing in food for inpatients from outside the hospital. To the questions in the beneficiary survey on the credibility of Vaiola Hospital as the top referral hospital, 70% of hospital staff and 95% of ex-inpatients recognised the improvement. In comparison, while the hospital staff had a rather harsher overall evaluation, ex-inpatients showed greater trust of the hospital.



Note: Number of respondents: 69 hospital staff; 22 ex-inpatients.

Figure 1: Credibility of Vaiola Hospital

Furthermore, the patient satisfaction survey in 2009 (680 respondents) conducted by the hospital revealed that 94% of the respondents answered either “highly satisfied (84%)” or “satisfied (10%)” to the question on the degree of cleanliness and comfort at Vaiola Hospital. Almost all the patients indicated they approved of service quality, with 96% of respondents saying that they were “highly satisfied” and 2% saying “satisfied” to the question on the quality of the services received. Thus, it can be said that Vaiola Hospital has been evaluated very highly by patients.

3.4.1.2 Changes in Health Indicators

When this project was under planning, infant and maternal mortality rates were 9.8/1,000 and 78.2/100,000 people, respectively. These figures were expected to decrease as an indirect effect of the project. Table 7 summarises the changes of these indicators after the completion of the project, showing no improvement since the project planning period. The main reasons for this could be: 1) the original hygiene conditions may not have been serious enough to threaten human life; and 2) in a country with a small population size like Tonga, a small change in numbers can result in a large percentage-wise change (e.g. the actual number of maternal deaths annually since 2006 was 3, 1, 2, and 3).

Table 7: Changes in Infant and Maternal Mortality Rates and Peri-Natal Mortality Rate

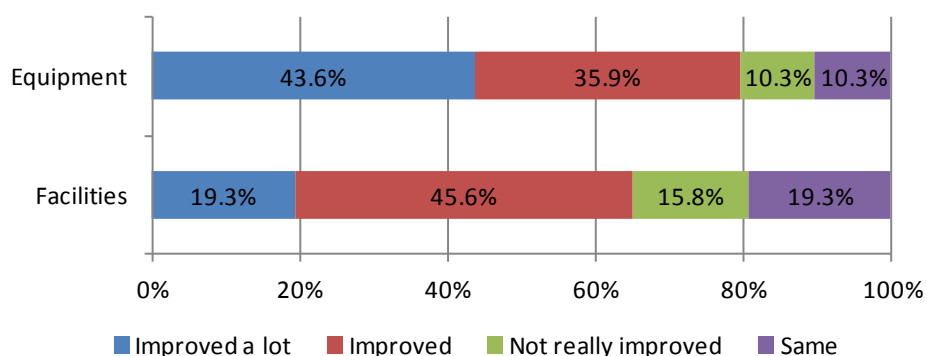
| | 2006 | 2007 | 2008 | 2009 |
|---|-------|------|------|-------|
| Infant mortality rate (per 1,000 persons) | 10.7 | 11.7 | 16.4 | 14.5 |
| Maternal mortality rate (per 100,000 persons) | 110.5 | 36.5 | 76.1 | 114.4 |
| Peri-natal mortality rate (per 1,000 deliveries) | 13.1 | 12.9 | 19.4 | 11.1 |

Source: Information provided by the Ministry of Health

The Ministry of Health places a greater value on the “peri-natal mortality rate (PNMR),” which measures the rate of any death of a fetus after 20 weeks of gestation and any death of a live-born baby within the first seven days of life, instead of the infant mortality rate, maintaining that the infant mortality rate measures the mortality of newborn babies up to one year old and it is not necessarily an appropriate index to measure the degree of improvement of obstetrical care. The PNMR was 24.0 in 1999, 16.9 in 2000, 18.5 in 2001, and 15.8 in 2002, but in recent years, it has been generally lower as shown in Table 7. Although there were annual fluctuations, this decrease has been realised by the improved medical care services and this project has been underpinning such improvement.

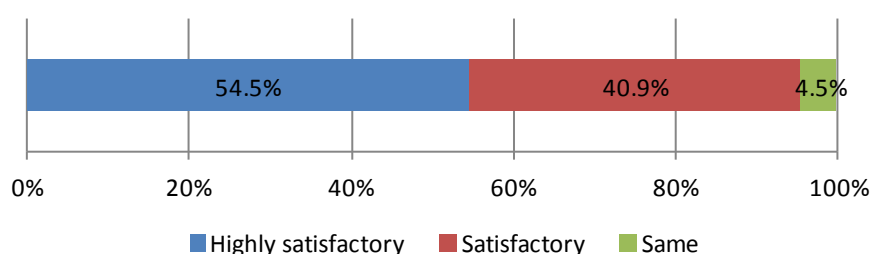
3.4.1.3 Evaluation of Upgrading of Facilities, Equipment and Medical Care Services

The beneficiary survey revealed that this project, with an aim of upgrading the facilities and equipment of Vaiola Hospital, was highly seen by the hospital staff as well as ex-inpatients. The major results are shown in the following graphs.



Note: Number of respondents: 78 for facilities; 57 for equipment

Figure 2: Level of Improvement of Facilities and Equipment (Hospital Staff)



Note: Number of respondents: 22

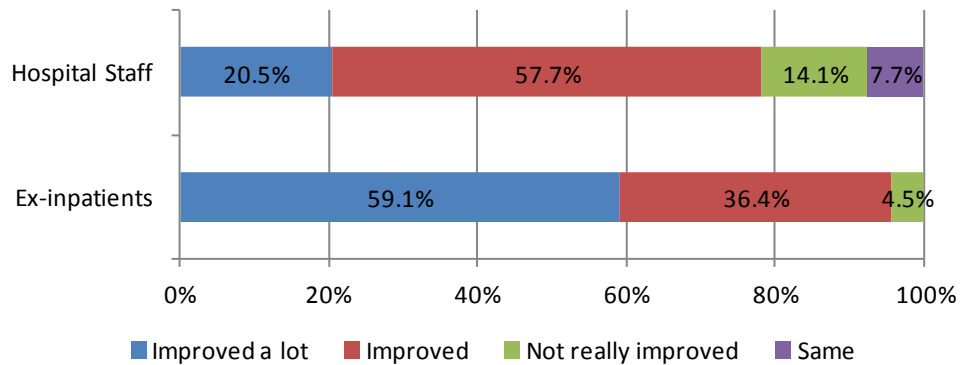
Figure 3: Satisfaction with the Improvement of Facilities and Equipment (Ex-inpatient)

While 79% and 65% of the hospital staff responded with “improved a lot” or “improved,” for facilities and equipment, respectively, some indicated “same as before” or “not really improved.” There were also some comments and requests for improvements related to functional failures of some facilities and poor maintenance of equipment. The primary reason for these harsher comments could be because of the amount of time hospital staff spend using the facilities and equipment.

On the other hand, ex-patients who were hospitalised or underwent operations in both the old and new facilities evaluated project changes more positively than the hospital staff. 95% of the respondents were satisfied with the improvement of the facilities and equipment, and 91% felt that the environments of the patient rooms, including cleanliness and hygiene conditions of the facilities, became better. All respondents stated that the medical equipment also had improved. Additional requests were often heard for improvements in air-circulation and cleaning of wet areas such as shower rooms and toilets.

Changes in the quality of medical care services were rated as “highly improved” or “improved” by 78% of hospital staff and 95% of patients. Additionally, “Project for Strengthening the Need-Based In-Service Training for Community Health Nurses,” a technical

cooperation project of JICA, started in October 2010, is expected to contribute to further improvement of medical care services, in addition to infrastructure development.



Note: Number of respondents: 78 hospital staff; 22 ex-inpatients

Figure 4: Change in the Quality of Medical Care Services

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

During the planning of the project, the need for implementing an environmental impact assessment and getting an approval from the Ministry of Environment was pointed out; it was confirmed that such assessment was conducted and approved as planned. During the construction period, the Ministry staff regularly checked the waste disposal conditions as well as the impacts on the surrounding areas, and found no issues. At the ex-post evaluation, it was noted that hospital wastes were treated with sterilisers and taken to a waste disposal site by a waste transport vehicle owned by the hospital.

Waste water treatment had also improved by the introduction of closed septic tanks that prevented emissions of evaporated waste water into the air. After treatment, waste water was appropriately permeated into the ground. Overall, there has been a significant improvement in this area.

3.4.2.2 Land Acquisition and Resettlement

Vaiola Hospital's overall upgrading project including this project was supposed to build all facilities within the existing premises, and the facilities in this project were all constructed on the premises. Thus, there was no land acquisition or resettlement observed in the project.

3.4.2.3 Other Indirect Impacts

As stated above, Vaiola Hospital's entire upgrading and refurbishment project was divided

into four phases¹⁰, based on the master plan developed with the WB's support. The first phase was implemented by the WB, followed by this JICA project as the second phase of the overall upgrading project. This project was implemented almost at the same time as WB's first phase project. As this project was the first one to concentrate on the clinical service building and ward buildings (WB's first phase was for surrounding facilities), design of the facilities under this project was taken over to the third phase (WB component)¹¹ and the fourth phase (currently being implemented as part of the second phase of the JICA project)¹². During this process, measures including the upgrading of the piping network, renovation of window frames, and the installation of a wall protection material were taken to solve the minor issues carried over from the previous phases. The final fourth phase was ongoing at the time of ex-post evaluation and scheduled to be completed in March 2012.

Based on the above, this project has significantly improved medical care services provided by Vaiola Hospital as well as their environmental impacts, and also underpinned an improvement in the peri-natal mortality rate. Consequently, the improvement of Vaiola Hospital as the top referral hospital has been contributing to the enhancement of the health services environment in Tonga.

3.5 Sustainability (Rating:②)

3.5.1 Structural Aspects of Operation and Maintenance

The implementing agency of this project is the Ministry of Health. However, the Ministry of Health and Vaiola Hospital are not clearly divided; the heads of the diagnostic departments are doctors and nurses. At the time of ex-post evaluation, the hospital had 44 doctors, 328 nurses, 104 engineers, and 204 administration staff (680 in total).

¹⁰ During the development phase of the master plan, the project was divided into six phases, but the construction work was divided into four phases.

¹¹ Construction of medical, paediatric, and psychiatric wards

¹² Construction of outpatient's ward, dental ward, and nurse school building etc. and procurement of medical equipment (see p.4 for details)

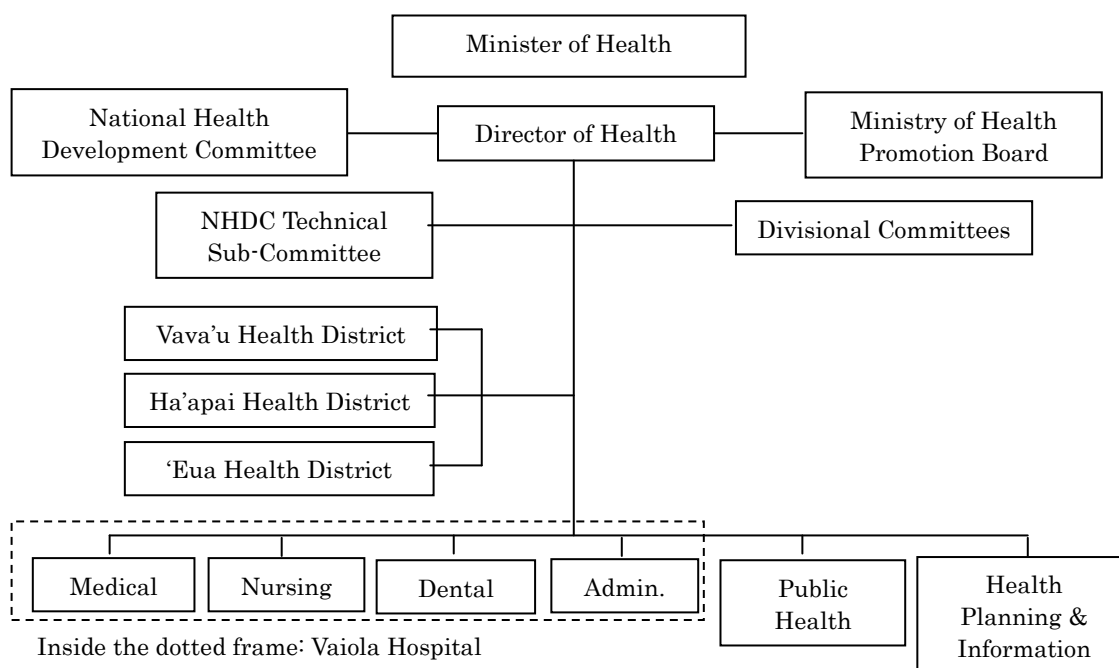


Figure 5: Organisational Structures of the Ministry of Health and Vaiola Hospital

Operation and maintenance of facilities and equipment are managed by the Maintenance Division (Biomedical, Electrical, Plumbing, Carpentry and Oxygen Plant) of the Administrative Department of Vaiola Hospital. This division is also in charge of the repairs of “Health Centres” located in various regions of the country. The basic role of this division has not changed since the planning phase till the ex-post evaluation period, but the number of staff has decreased from 18 during the planning phase to 9 at the time of ex-post evaluation. On the other hand, an asset management position was newly established and the Facilities and Equipment Committee, comprised of Director of Health and 13 other officials, was also established in March 2011 to appropriately manage the asset of the Ministry of Health through holding monthly meetings.

The number of staff in charge of operation and maintenance of the facilities has been continuously decreasing, and, in fact, the existing needs of diagnostic divisions have not been fully satisfied. Capacity development and securing enough human resources are considered to be the important factors. Simple tasks including cleaning are outsourced to private companies. The Committee is going to consider appropriate task allocations and the optimal number of staff.

3.5.2 Technical Aspects of Operation and Maintenance

There was no technical issue in operation and maintenance of the facilities in general. The elevator in CSB is regularly maintained by an outsourced company. As to the equipment, the know-how of the staff is not sufficient, particularly in that much time seemed to be needed to learn how to properly maintain biomedical equipment requiring special technical abilities or knowledge.

But, training or seminars on operation and maintenance have not been provided in a systematic way. In order to deal with the lack of skills, a JICA volunteer with expertise on biomedical equipment maintenance has been stationed at the hospital. Also, under the support of the Australian Agency for International Development (AusAID), an expert on biomedical equipment maintenance regularly visits Vaiola Hospital to instruct on how to repair the equipment and to introduce a maintenance management software.

3.5.3 Financial Aspects of Operation and Maintenance

Revenues from fees collected for hospitalisation or examination contribute to the budget of the Ministry of Health, but basically, as medical care and medicines have been traditionally free of charge, the majority of the budget is allocated by the government. Vaiola Hospital's recent expenses have been 76% to 95% of the total budget of the Ministry, representing the significance of the hospital in Tonga. The government enacted the following rules, "Health Services (Fees and Charges) (Amendment) Regulations 2008," which define health service charges. The Tongan government, however, is planning to collect medical charges for outpatient treatment and for medicines from individual patients to reduce the financial burden after the overall project for upgrading Vaiola Hospital is completed.

Table 8: Total Budget and Maintenance Budget of the Ministry of Health

(Unit: 1,000 Tongan Pa`anga)

| Fiscal Year (Jul.-Jun.) | 2006/07 | 2007/08 | 2008/09 | 2009/10 |
|--------------------------------------|---------|---------|---------|---------|
| Budget of the Ministry of Health | 20,170 | 17,761 | 21,580 | 21,375 |
| (of which Vaiola Hospital's revenue) | (331) | (506) | (506) | (1,000) |
| (Health budget per person) | (0.196) | (0.174) | (0.210) | (0.207) |
| Maintenance budget | 620 | 632 | 1,321 | 1,500 |
| % of the total budget | 3.1% | 3.6% | 6.1% | 7.0% |
| Expenditure of Vaiola Hospital | 17,909 | 16,873 | 18,408 | 16,313 |
| % of the total budget | 88.7% | 95.0% | 85.3% | 76.3% |

Source: Ministry of Health Annual Report and Information provided by Ministry of Health

When the overall support for the redevelopment of Vaiola Hospital was determined, there was an agreement with the WB to set the maintenance budget at 7% of the total health sector budget. As shown in Table 8, this level was achieved in the 2009/10 Budget. However, while the total amount is 7%, it also includes expenses for cleaning, etc. and the amount allocated to the maintenance division still remains less than 1%. When the fourth phase (the second JICA project) is completed, the number of facilities and equipment will increase and the importance of maintenance will be even higher. Thus, the maintenance budget should be appropriately secured and allocated. As stated above, the individual payment system of medical expenses is planned to be introduced. Therefore, it is important for the Facilities and Equipment Committee to develop a maintenance plan; based on this plan, the budget will need to be secured and allocated appropriately, and the spending process

will also need to be streamlined.

3.5.4 Current Status of Operation and Maintenance

During the field study visits for the ex-post evaluation survey, it was found that the environment and functions of the surgical ward, obstetrics ward, and CSB were improved and generally maintained in good condition. Major equipment checked during the limited time was also well utilised; some of the equipment that had broken down, such as air-conditioners, were replaced.

On the other hand, the following major issues were found.

- Large steriliser: One of the two large sterilisers provided under this project was not working and the remaining machine was being overused. The broken steriliser will be replaced under JICA's follow-up scheme in FY2011.
- Special Care Nursery: The nursery environment had degraded because of plumbing troubles. These troubles were scheduled to be repaired also under JICA's follow-up project in FY2011.
- Rainwater gutters: Gutters and fixings were rusty because different metal materials were used. Regular repainting to prevent rust is necessary.

The replacement of the large steriliser and the repair of Special Care Nursery will be properly handled under consultations between the Ministry of Health and JICA.

Some equipment seemed poorly utilised because of the delays in parts procurement or the lack of skills to repair them internally, resulting in waits for visits by an external expert in fixing biomedical equipment. From the viewpoints of the limitations and the effective use of the budget, orders cannot be placed in advance as the parts are different for each type of equipment. And, in particular, the shipping time is longer when these parts need to be ordered from Japan.

In order to solve these problems, it is important to develop a maintenance plan at an early stage, to check or repair equipment in a preventive manner based on the plan, to secure a flexible budget to enable repairs in a short time, and to develop human resources to identify the problems internally. The Facilities and Equipment Committee, comprised of high-ranked officials including Director of Health, is expected to play an important role in the development and effective implementation of the maintenance plan.

Based on the above, some problems have been observed in terms of maintenance techniques and conditions, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Government of Tonga is aiming to improve medical care services in the country as a national policy. This project to support the upgrading and refurbishment of Vaiola Hospital, the only hospital

providing advanced medical care services in the Kingdom of Tonga, is consistent with such policy. As for project implementation, in spite of slight changes, the outputs, the cost and the period of the project were in line with the original plan. Although the achievement levels were lower than initially targeted figures, domestic demand for medical care services was fully met and these services generally became more effective and safer, resulting in improved credibility and higher satisfaction in regard to the hospital. With respect to sustainability, while steady progress has been made in institutional strengthening and the O&M budget, there are still some issues to be tackled in terms of technical skill levels and human resources in the maintenance division.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

The Ministry of Health / Vaiola Hospital has been trying to improve its facilities and equipment maintenance through institutional strengthening by establishing a post in charge of asset management and the Facilities and Equipment Committee, and increasing in the maintenance budget to 7% of the Ministry's budget. The maintenance division itself, however, still seemed to be lacking in the necessary number of workers and relevant skills. In particular, no staff members with high skills or advanced knowledge on biomedical equipment have been assigned. Inappropriate repairs may threaten human lives; if no qualified agents exist within the country, it would be necessary to secure a technician with specialised knowledge of biomedical equipment and the ability to make appropriate judgements in identifying the statuses of break-downs and sending such equipment out to the original manufacturers for repair. While there is an issue that people tend to emigrate overseas when they get skills, continuous development of human resources is needed.

Specific actions are being taken for this purpose like the starting of a programme for inviting a biomedical engineer to Tonga for two years, and dispatching Tongans to a biomedical engineering institute in Australia for long-term training in order to develop an O&M system with support from Australia. As these programmes can be of great value in increasing the effectiveness of this project, it is hoped that they will be carried out as planned.

4.2.2 Recommendations to JICA

The Vaiola Hospital is the only hospital capable of providing advanced medical care services in Tonga. Therefore, preserving the level of its medical care services is a very fundamental challenge for the country. Accordingly, appropriate maintenance of facilities and equipment upgraded under this project and continuous cooperation are very important. At present, cooperation by an expert on the management of biomedical equipment is ongoing with AusAID's support, and is expected to continue for some time. On the other hand, staff training on how to handle/maintain facility-related equipment including biomedical devices is needed. Therefore, further technical assistance in cooperation with qualified experts will be beneficial.

4.3 Lessons Learned

4.3.1 Development and Implementation of Maintenance Plan

In the middle of 2000s, when a senior volunteer expert on biomedical equipment was dispatched from Japan, Vaiola Hospital was regularly holding meetings on the maintenance of facilities and equipment. Such meetings are thought to be effective in preventing equipment malfunction to a certain extent through the creation a maintenance plan, checking the equipment regularly, and training for nurses on how to handle the equipment. When implementing similar projects, it may be useful to put intensive efforts in conducting trainings on equipment maintenance to all staff members, along with the provision of equipment.

4.3.2 Coordination Among Each Phase of the Overall Project

This project constitutes a part (the second phase) of the master plan for upgrading the entire Vaiola Hospital.

Major development partners are the WB and JICA who undertook each phase in turn, and issues identified in previous phases were considered in the following phases. Some examples include an improvement in the plumbing network, remodelling of the window frames, and the installation of protective materials on the wall of the corridor. These outcomes are the fruits of efforts made by the Ministry of Health. Even though this project involved multiple support organizations, consultants, and contractors over a long period of time, the implementing agency coordinated each phase, and realised the actualisation of comfortable, effective, and durable facilities. In the final phase, which was under implementation at the time of ex-post evaluation, issues found in the previous phases were being considered and solutions put into action.