

**TB PREVENTION AND CONTROL IN PNG  
REPORT OF THE REVIEW OF CONTRIBUTION OF DFAT INVESTMENTS  
2011-2018**

22 March 2019

**Specialist  
Health  
Service**

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## Acronyms

|             |   |
|-------------|---|
| ADB         | Asian Development Bank                          |
| BMU         | Basic Medical Unit                              |
| Burnet      | The Burnet Institute                            |
| CPHL        | Central Public Health Laboratory (PNG)          |
| DART        | Daru Accelerated Response to TB                 |
| DR- TB      | Drug -resistant TB (also referred to as MDR-TB) |
| DFAT        | Department of Foreign Affairs and Trade         |
| DGH         | Daru General Hospital                           |
| DOTs        | Directly Observed Treatment                     |
| DS-TB       | Drug susceptible tuberculosis                   |
| ER          | Emergency Response                              |
| GBV         | Gender Based Violence                           |
| GESI        | Gender and Social Inclusion                     |
| GOA         | Government of Australia                         |
| GOPNG       | Government of Papua New Guinea                  |
| HHISP       | Health and HIV Implementation Service Provider  |
| HSS         | Health System Strengthening                     |
| HSSDP       | Health Services Sector Development Program      |
| HPP         | DFAT Health Portfolio Plan                      |
| LTFU        | lost to follow-up                               |
| LPA         | Line Probe Assay                                |
| M & E       | Monitoring and Evaluation                       |
| MDR-TB      | Multi drug-resistant tuberculosis               |
| MSF         | Médecins Sans Frontières                        |
| NCD         | National Capital District                       |
| NDOH        | National Department of Health                   |
| NGO         | Non-Government Organisation                     |
| NHP         | National Health Plan                            |
| NTBSP       | National TB Strategic Plan 2015-2020            |
| PEC         | Patient education and Counselling               |
| PHA         | Provincial Health Authority                     |
| PNG         | Papua New Guinea                                |
| QMRL        | Queensland Mycobacterium Reference Laboratory   |
| rGLC        | regional Green Light Committee (WHO)            |
| RID- TB PNG | Reducing the Impact of Drug Resistant TB in PNG |
| RR-TB       | Rifampicin resistant tuberculosis               |
| SAT         | Self-administered treatment                     |
| SFD         | South Fly District                              |
| TAT         | Turn Around Time                                |
| SDG         | Sustainable Development Goal                    |
| TB          | Tuberculosis                                    |

|         |  |
|---------|--|
| TB-PALS | People Affected by, Living with, or having Survived TB |
| UHC     | Universal Health Coverage                              |
| WB      | World Bank   |
| WHO     | World Health Organisation                              |
| WP      | Western Province                                       |
| WV      | World Vision   |
| XDR-TB  | Extensively Drug Resistant Tuberculosis                |
|         |  |

## EXECUTIVE SUMMARY

### Introduction

This is the report of the 2018 independent review of the Australian government's investment in tuberculosis (TB) since 2011 in Papua New Guinea (PNG). The review was commissioned by the Australian Department of Foreign Affairs and Trade (DFAT) (Annex 1, *Terms of Reference*). The *TB Review Plan* (Annex 2) gives an overview of the review methodology. The review team consulted widely (Annex 3, *People Consulted*) and was informed by (i) the higher order goal of Australia and PNG government relationships and (ii) over 240 documents including key PNG and Australian government (GOPNG and GOA) policies and strategies and expert reviews and analyses (Annex 4, *Selected Background Documents*).

The GOA investment from 2011 responded to TB being a major public health problem in PNG. TB is one of the seven health program priorities in the PNG National Health Plan (NHP) 2016-2020 and reducing the burden of communicable diseases is one of the eight key result areas. There is also a National TB Strategic Plan for Papua New Guinea (2015-2020) (NTBSP) with which the GOA investment aligns. In 2014 a TB emergency was declared. Daru and Western Province, the National Capital District (NCD), and Gulf Province were designated TB 'hot spots'. In 2017 WHO classified PNG as one of only 14 countries that has a triple high burden of DS-TB, MDR-TB and TB-HIV co-infection. GOA TB investments are in Daru from 2011, NCD from 2016/2017 and various nationally-focused TB investments.

Partly as a result of the incremental nature of the initial TB investment and the urgency of the TB emergency response from 2014 there is no programmatic design or monitoring and evaluation (M&E) framework for the DFAT TB investment in PNG. The review therefore used the DFAT generic M&E framework complemented by crosscutting themes derived from core documents. The review also took a systems approach to sustainability in controlling the TB epidemic in the longer term, recognising the interrelatedness of the sustainable development goals (SDGs), universal health coverage (UHC) and health system strengthening (HSS) needs (see Figure 1 in Section 1.2 of this report).

Data sources included the routine reporting to the PNG National TB Program (NTP), the 2016 and 2018 World Health Organisation (WHO) Regional Green Light Committee Reviews (rGLC), the WHO 2017 TB Epidemiological Review and Impact Analysis of Tuberculosis in Papua New Guinea, the 2018 WHO Global TB Report and others. The quality of data from Daru improved from 2014/2015 including with additional demographic data, patients' address, laboratory investigations and various process indicators. In NCD there are known data inefficiencies and eHealth solutions are being rolled out and tested.

### Australian government support

The Australian government is the key external financial contributor to TB in PNG. The overall investment since 2011 is AUD60m with AUD54m expended to date. The balance is to be expended in 2019 and the majority of funding ceases in September and December 2019. As well as the GOA TB investment in Daru and NCD, other TB GOA investments include the World Health Organisation (WHO), the Global Fund and the World Bank (WB). For the WB, GOA co-finances AUD8m of its new USD15m (AUD20m) loan and provides parallel funding of AUD12m (not part of the WB loan). A feature of the DFAT TB investment in PNG is funding not-for-profit technical partners to support GOPNG implementation rather than managing contractors (Annex 5, *DFAT TB Investment in PNG*). DFAT is also co-funding (with the Asian Development Bank [ADB]) the Health Services Sector Development Program (HSSDP), a major health system strengthening strategy which will assist the TB response as well as much else.

## Context

PNG is a lower middle-income country and, while the government is prioritising health and education, the TB epidemic in PNG is compounded by areas of poverty and illiteracy, and a weak health system. Poverty and illiteracy influence overall health including nutrition and timely access to health care. PNG's weak health system results in delays in TB diagnosis, inadequate and ineffective TB treatment and influences health seeking behaviours including utilisation of health services.

PNG is one of the 30 high drug susceptible TB (DS-TB,) and multi-drug resistant TB (MDR-TB) countries in the world. Extensively drug resistant TB (XDR-TB) also exists.<sup>1</sup> An estimated 791 (7%) of 27,934 people who developed TB in PNG in 2017 were HIV-positive and of these 753 (95%) were on retroviral therapy. PNG has the highest proportion of children in the world affected by TB, 25%, compared with around 10% elsewhere. TB is a leading cause of death in PNG with mortality of 53 per 100,000 population.

The 2014 TB public health emergency in PNG was triggered by a documented outbreak of MDR-TB in South Fly District (SFD) in Western Province (WP) with 44% of new MDR-TB cases, implying primary transmission of resistant strains of TB in the community. Approximately 25% of new TB patients were MDR-TB in 2013/2014 and 34% in 2016. Molecular epidemiology studies by Bainomugisa, Lavu et al in 2018 showed MDR-TB strain clonal outbreak.

NCD has 25% of the TB burden in PNG while only 5% of the population (364,125 at 2011 Census). NCD is a high risk for amplification as it has a high fluctuating population from other provinces and many informal, crowded settlements. WP is the largest and most sparsely populated of PNG provinces while Daru Island at 15 kilometres long is crowded with a population of 15,142 (2011 Census). In WP there are biosecurity risks because of the shared national borders with Australia and Indonesia.

## Findings

### Overall

The review findings echo those of all consulted: the GOA TB investment is fundamental, critical to the success of the GOPNG-led TB emergency response nationally, in Daru and to the more recent markedly strengthening of the emergency response in NCD. Without GOA support, the view of senior PNG health leaders consulted is that the GOPNG-led emergency response may have collapsed.

DFAT support is a key contributor to GOPNG accelerating progress towards two government priorities in Daru and NCD. The first is the NHP priority of reducing the burden of communicable diseases. The second is a strategic objective of the NTBSP - to improve the quality of diagnostic and treatment services with local ownership. Two GOPNG national targets for 2020 are case notification of 93 per 100,000 population and treatment success of 88%. The GOA TB investment aim in 2012 was to “to support the Government of PNG to significantly reduce morbidity and mortality from TB and MDR-TB in South Fly/Western Province and Torres Strait, through sustained quality TB control and strong cross border coordination, in line with National PNG TB targets”.<sup>2</sup> TB targets announced by the GOA then Minister for Foreign Affairs in 2012 was up to 80% early detection in WP and treatment success of 85%. In Daru, the latest complete year of treatment outcome data for DS-TB is 2017, and for MDR-TB it is the 2016 TB cohort. The TB response in NCD is recent and data is not yet comprehensive. In Daru

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<sup>1</sup> In high burden TB countries 'DS-TB' is usually referred to simply as 'TB'; in this report 'DS-TB' is used to clarify and distinguish between MDR-TB or XDR-TB.

<sup>2</sup> Government of Australia. 2012. *Tackling Tuberculosis in Western Province, Papua New Guinea. A long term approach to ensure effective and sustained TB services.* Canberra, Australia.



the DS-TB treatment success rate in the 2017 was 85% and for MDR-TB in 2016 it was 87.3%, outstanding results.

The 2016 and 2018 rGLCs showed however that while there is progress, the TB situation across PNG remains complex. The 2018 rGLC found there were (i) increases in case notifications<sup>3</sup>, (ii) improvements in TB treatment close to 80% and reductions in deaths and loss to follow up in both drug sensitive (DS) and MDR-TB, (iii) stable level of new cases of MDR-TB but also (iv) a high number of new cases of MDR-TB with no contact to existing patients suggesting many primary cases, high 'latent TB'<sup>4</sup>.

In Daru in 2017 and 2018 there was high newly diagnosed MDR-TB (see Figure 9 in this report). The implication is community transmission of drug resistance bacilli meaning more effort is needed for active TB case search and treatment and preventing TB through preventative TB therapy for active epidemic control. There is a decrease in case notifications in Daru from 1,038 per 100,000 people in 2014 to 784 per 100,000 in 2018, which signals a significantly positive impact of the DFAT-supported response. There is also a continuing high number of case notifications reinforcing the need for sustained effort over the next 7-10 years to reduce the burden of TB.<sup>5</sup> To achieve epidemic control more needs to be done to strengthen active case finding, treatment and to scale up preventive therapy.<sup>6</sup>

The logistically complex roll-out to the rest of WP has commenced. This is a major challenge and important on many fronts including that TB patients will be able to remain in their communities instead of having to come to Daru to live away from families and having to source food and water, sometimes with difficulty.

There are early encouraging signs in NCD although the context is different. NCD has a larger population, distances are greater for people to travel for treatment and there are many informal settlements with larger floating populations than Daru including from other provinces, highlighting the risk of amplification.

Sufficient data is available in Daru, but not yet from NCD, to determine economic benefits from the emergency response. Since 2014 DFAT-supported initiatives in Daru has averted at least **255 deaths and 1,037 MDR-TB and 4,339 DS-TB additional new infections**; increased productivity by **1,760 additional years** over the life course; saved **AUD3,089** per life year gained; saved pharmaceutical costs of **AUD8.2m**; and provided an overall return on investment of **AUD2.30** in benefits for every dollar spent (*Annex 7, Return on Investment DFAT Funding in Daru*).

Adherence to TB treatment protocols is critical; concerns were expressed to the review team about variable compliance. A review of quality assurance and monitoring mechanisms would assist, as well as early training when new people are appointed. GOPNG protocols reflect evidence-based current practice, in line with global WHO guidance and rGLC advice and are updated as new WHO protocols are released. There were major changes in 2018 and more are anticipated in 2019. Strong coordination of and support for national and provincial uptake of new guidelines is important.

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<sup>3</sup> 'TB notifications' are the number of new and relapse TB cases notified in a given year, per 100 000 population to the national surveillance system and then on to WHO. An increase may indicate improved reporting and case detection with an increase in the early years of the program with a longer-term decrease in the number of cases identified as the program and screening is strengthened.

<sup>4</sup> 'Latent TB' is defined by the US Centre for Disease Control as people who are infected with TB but do not feel sick nor have any symptoms. Persons with latent TB infection are not infectious and cannot spread TB infection to others. Without treatment about 5-10% of those infected with TB but with no symptoms will develop TB disease at some time in their lives, about 50% within the first two years of infection.

<https://www.cdc.gov/tb/publications/factsheets/general/ltbiandactivetb.htm>

<sup>5</sup> Morris et al. 2018. *The Emergency Response to Multi-drug Resistant Tuberculosis in Daru, Western Province, Papua New Guinea 2014-2017 (in press)*. Papua New Guinea.

<sup>6</sup> Morris et al. 2018. *The Emergency Response to Multi-drug Resistant Tuberculosis in Daru, Western Province, Papua New Guinea 2014-2017 (in press)*. Papua New Guinea.

Experience in Daru is informing efforts in NCD, including training such as field-based mentorship, didactic and experiential training, and international clinical and public health advisor support. Local leaders of clinical excellence should increasingly be developed and provide training and peer support. A key lesson learned from Daru is the importance of early training of health leaders when appointed. Both proactive and responsive training should be integral to the proposed new DFAT TB investment design.

Rapid diagnostic and early treatment initiation are critical, as well as the treatment of TB infection, to improve treatment outcomes and reduce transmission. There is high loss-to-follow-up (LFTU) in NCD (> 33% in some areas). An important priority is to accelerate the inter- and intra-connectedness (referral mechanisms, outreach, patient tracing) between the geographically organised community care models and hospitals in NCD, building on and adapting lessons learned from Daru and elsewhere. This includes for paediatric patients whose outpatient care is largely through clinics at Port Moresby General Hospital (PMGH).

To alleviate staff anxiety about being infected with TB by patients and assist the response a stronger systems approach could be considered. For the patient journey this could include training for multidisciplinary hospital staff along the patient journey, not only those working in TB wards or clinics and a stronger health system strengthening (HSS) emphasis.<sup>7</sup> For HSS this could take the form of linkages with HSSDP initiatives such as for data systems and management development for key players in the TB response. It will be important, not to diminish the necessary vertical TB focus.

Given these factors and the magnitude of the TB epidemic and the socio-economic and health system challenges in PNG, ongoing DFAT investment is needed over the longer term, say 7-10 years.<sup>8</sup>

#### Relevance

The Australian government investment has been and will continue to be essential to the GOPNG TB response. Australian support is a foundation of the response in WP and NCD and to national efforts (for example through NDOH and WHO) and is strongly technically relevant. The GOA investment in WHO has enabled WHO's critical work on standards and protocols and its co-chairing of the national emergency response with National Department of Health (NDOH). These are important and effective and should continue.<sup>9</sup>

#### Effectiveness

The outstanding results in Daru would not have been possible without the strong DFAT support. The impressive gains in Daru were driven by early detection and adherence to treatment, the strong service delivery first at DGH (supported by Burnet) and then the strong community-based services including patient education and counselling, active case finding through contact tracing and community engagement (supported by Burnet and World Vision). The new DFAT investment design should consider strategies to eliminate TB on Daru Island as well as control the epidemic in NCD and the rest of WP, and perhaps elsewhere depending on GOPNG need and GOA budget.

Watch points that the new DFAT design should consider are the roll-out of the programmatic emergency response to the rest of WP; the high number of primary MDR-TB and XDR-TB patients in

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<sup>7</sup> A patient journey approach allows providers to "see" and understand the patient's experience by separating the management of a specific condition or treatment into a series of consecutive events or steps (activities, interventions, or staff interactions, for example). The sequence of these can be viewed as a patient pathway or journey. Improving the patient journey involves the coordination of multidisciplinary practice, aiming to maximise clinical efficacy and efficiency by eliminating ineffective and unnecessary care, and improving the quality or efficiency of clinical management and to alter the focus of care towards activities most valued by the patient. ([www.bmj.com/content/341/bmj.c4078](http://www.bmj.com/content/341/bmj.c4078))

<sup>8</sup> This is in line with the recommendation of the 2018 WHO Green Light Committee Review.

<sup>9</sup> There was an initial *TB Emergency Response (ER) Task Force* established in 2014 co-chaired by the National Department of Health (NDOH) and the World Health Organisation (WHO), which was restructured to the *ER Steering Committee* with a higher-level focus (strategic direction, protocols and standards, and coordination and monitoring against high-level TB indicators) and which continues to be co-chaired.

Daru; the small number of patients on the shorter MDR-TB regimens (11%) in Daru and the implications of the new WHO guidelines in both WP and NCD and scale up to newer TB drugs; the poor DGH infrastructure other than that from TB-related funding by DFAT; provincial TB coordination; TB clinical service delivery at DGH; laboratory systems; and uptake of and adherence to new guidelines and policies.

Lessons learned from Daru include that a low hospital operational budget impacts TB treatment. In Daru this includes challenges in providing the essential additional nutrition needed for TB patients, and medical supplies issues including having ancillary/side effect drugs (e.g. potassium supplements, anti-emetics) and other supplies such as for ECGs and laboratory reagents for biochemical analysis. The review was advised that stock-outs in Daru have resulted on occasion in adverse patient outcomes. There is also difficulty in attracting and retaining hospital staff, compounded by poor staff accommodation. DFAT is funding some financial incentives to attract and retain key staff in Daru, a critical investment to date, and DFAT has funded some TB-related DGH operational costs. The situation in NCD continues to unfold: hospital operational budgets are also low, while staff attraction and retention is likely to be less severe.

The mobile screening uptake in Daru is around 65%. Some health experts consulted during the review thought the current approach is only partially systematic and insufficiently rapid for an emergency response. Mandatory screening in 2019 is being discussed at a national policy level to increase the uptake. This may give rise to ethical issues.<sup>10</sup> An alternative could be expansion of a household and community-based screening model, with the important intervention of preventive treatment of latent TB. WV will conduct 'mop up' screening in Q1 2019 and an effectiveness review is recommended in Q2. Mobile screening in NCD is planned for later in 2019 and may include GeneXpert ultra-testing.<sup>11</sup> This is supported by the review as is purposeful systematic screening in NCD.

There is a DFAT-funded Child TB Project at PMGH trialing a new paediatric pharmaceutical regimen. The more palatable paediatric formula is now being implemented throughout PNG with GOPNG funding – an excellent return on the GOA investment. The previously recommend strengthening of discharge of hospital TB patients in NCD to community-based care, including paediatrics, should assist in reducing the high LFTU.

### Efficiency

Adherence to TB treatment is a fundamental efficiency and continual strengthening of both proactive and responsive continuing professional development and quality assurance mechanisms are needed to support and monitor adherence. This is especially important as the new 2019 WHO protocols are implemented.

Community-based services have a patient-centred care focus that includes observed treatment, community engagement, education, counselling, outreach, peer-support, referral and monitoring systems. Treatment supporters and contact tracing teams both make home visits. While the two have different roles and competencies, efficiency gains could be explored - for example for health education. Use of volunteers is a cost efficiency.

There was a reduction in length of stay at Daru General Hospital (DGH) consequent to the community-based initiatives - from many months in some instances. There was also a steady and rapid decrease in TB ward occupancy from 100% and the waiting list for admission including for MDR- and XDR-TB patients. The MDR-TB ward occupancy was 10% during the review team's visit to Daru in December 2018. The WP roll out may increase demand initially for the MDR-TB ward at DGH, while effective

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<sup>10</sup> The principle of the autonomy of the individual is central to medical ethics.

<sup>11</sup> GeneXpert tests diagnose TB and rifampicin resistant (RR) TB in 2 hours; sensitivity is imperfect in smear-negative and HIV-associated TB and Ultra GeneXpert testing is a second-generation test designed to overcome sensitivity limitations and it also gives results in 2 hours; its development was co-funded by GOA. Ultra GeneXpert testing will have special impact for children, HIV/TB co-infected patients and other difficult-to-diagnose groups by enabling rapid TB diagnosis.

community treatment should result in a short length-of-stay for any patients that require hospitalisation. An analysis of projected TB case load for DGH over the next, say, five to seven years is needed as part of the WP roll-out. Influencing factors include the model of care and patient accessibility to local treatment and care and monitoring. The analysis will provide the evidence needed for decisions, avoiding current local suggestions by some to arbitrarily reduce the number of MDR-TB beds. TB ward occupancy appears high at PMGH and TB outpatient clinics – adult and paediatric - crowded. The recommend purposeful discharge to community-based care will assist.

Protecting staff and other patients from TB cross-infection requires ongoing vigilance. DGH's efforts are to be applauded. PMGH would benefit from improvement e.g. wider wearing of N95 respirator masks.<sup>12</sup> The recommended training for multidisciplinary hospital staff along the patient journey, not only those working in TB wards or clinics will assist all hospitals.

In PMGH, X-ray facilities are overwhelmed by TB demands (3,200 X-rays per month) potentially compromising diagnosis and care of non-TB patients with delays adding to infection control risk. DFAT is funding an additional X-Ray machine at PMGH to ease the load (under the Child Fund TB Project). An independent assessment of the impact of this is recommended in 2019 given the many other inputs required to maximise its potential impact (space, staff, supplies, etc).

The timeline to start Line Probe Assay (LPA) tests in PNG at the Central Public Health Laboratory (CPHL) should be accelerated to Q1 2019, with a saving of **AUD69,710** per annum (Annex 9, *Return on Investment LPA Automatic Machine*).<sup>13</sup> There has been a two-year delay in moving testing from Queensland to PNG – a rGLC 2016 recommendation – one reason being different technical views about which testing machine was to be purchased, manual or automatic. GOPNG has now determined automatic.

GeneXpert test results need to be returned on the same day to reduce the Turn Around Time (TAT) and accelerate treatment initiation. The opportunity costs of current delays are unacceptably high. The test takes two hours. At PMGH, results take three weeks from the test being ordered with an opportunity cost in bed days of **AUD12.5m** and a possible **170** additional infections. The two-day waiting time at DGH seems efficient in contrast to PMGH but is also inefficient as it creates (i) downstream infection control risks (up to **25** new infections at a cost of **AUD49,784**) given the poor state of the hospital and (ii) community, patient and staff distress because of the delays and risk of cross-infection (while noting that many if not most transmissions occur in the community prior to diagnostic testing) and (iii) additional bed occupancy costs of **AUD258,713** (Annex 8, *Return on Investment GeneXpert Machines*). The solution for same-day test results at DGH is internal, is easily fixed and should be in Q1 2019. At Six Mile Clinic in NCD there is a large testing backlog as there is elsewhere in the community-based services in NCD. Some GeneXpert machines have been already purchased for NCD community services and should be made available immediately and appropriate training provided.

There are improved systems at the DGH TB drug store since the rGLC 2018, which commented adversely on inefficiencies such as USD100,000 of expired drugs. Given that the 2019 WHO guidelines recommend immediate cessation of kanamycin and capreomycin the risk of future oversupply needs to be balanced against the risk of too slowly implementing the new guidelines.

### Sustainability

Sustained effort is required for 7-10 years to effectively control the epidemic, and ideally end it. There are a continuing high number of new cases in Daru and NCD, the DFAT-supported NCD response is in

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<sup>12</sup> N95 respirator masks are designed to help reduce the wearer's respiratory exposure to airborne contaminants such as particles, gases or vapours. N95 respirators are appropriate for the majority of airborne precautions encountered in healthcare facilities.

<sup>13</sup> Line Probe Assay (LPA) laboratory tests are designed to identify TB and simultaneously detect mutations associated with drug resistance.

an early phase, the complex roll-out to rural areas in WP is only just beginning, TB (MDR and DS) is perhaps more wide-spread in other provinces than may have been realised, treating MDR-TB is complex and direct costs are high (notwithstanding it is cost-effective) and the PNG economy is weak, and the health system weaknesses in PNG are many.

The high TB prevalence in PNG is a grave threat to PNG achieving its economic potential and partnerships with the commercial sector could be explored given they require a healthy workforce for their continuing and future commercial success. The review suggests DFAT consider stronger engagement with the commercial sector and other development partners to support GOPNG address contributory causes of TB (e.g. health infrastructure, affordable housing, water and sanitation). There may also be opportunity for DFAT to embed health improvements for local communities in its various economic development programs and to discuss a similar approach with development partners. The magnitude of the challenge is not underestimated but a purposeful long-term approach is needed, as is bold thinking.

#### Gender and social inclusion

Gender and social inclusion are critical in the TB response in PNG and there has been continual improvement and good practices (See Annex 6, *Gender and Social Inclusion*). The average ratio of notified male to female TB cases in PNG from 2010 – 2015 was 1.07 (range 1.01 - 1.15) and remains stable.<sup>14</sup> Data suggests a similar ratio in Daru and NCD (See Annex 6, *Gender and Social Inclusion*). This ratio is significantly lower than the global average in low-income countries of 2 male cases for every 1 female TB cases.<sup>15</sup> The reasons for this are uncertain but may include general community transmission versus gender congregate settings such as prisons and mines. Many consulted in NCD and WP spoke of their efforts to reach out to women through education and engagement with TB treatment. Part of this is the DOTS model making it easier for women, and those most vulnerable, to access treatment with the back-up of treatment supporters who go to them if they don't present for treatment. A behavioural pilot study has been conducted in Daru (and is in analysis) and a study is planned in Daru and NCD, to further understand TB health seeking behaviours of men and women. It would be useful to understand whether the demographic profile of those diagnosed with TB matches the profile of those where laboratory tests confirm infection with TB.

#### Governance, management and partner coordination.

DFAT funding has supported the effective NDOH leadership, structures and processes for the emergency TB response. WHO's technical support to NDOH is highly relevant and is a valuable investment by DFAT. The new WB loan co-financed by DFAT, and its project management unit will further augment the national response. The technical expertise of DFAT-funded implementing partners in WP has been amply illustrated and in NCD is being demonstrated in these early days.

The outstanding successes in Daru are due to the efforts of many including the strong national and local TB leadership and management, and the competent and committed technical partners - the Burnet Institute and World Vision, and the efficient support of HHISP. A lesson learned from Daru is that the absence of a provincial TB coordinator or an agreed, robust design or framework can contribute to misunderstandings of roles and responsibilities and technical approaches between partners. Good processes are needed to mitigate these issues and to assure a strong and cohesive technical approach. Sorely needed is an appointment to the vacant WP TB coordinator position - either a PHO medical TB leader or a senior officer as happened previously with success. If there is no appointment imminent then DFAT may need to consider appointing a leader from the implementing

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<sup>14</sup> Aia P, Kal M, Lavu E, John LN, Johnson K, Coulter C, et al. 2016. *The Burden of Drug-Resistant Tuberculosis in Papua New Guinea: Results of a Large Population-Based Survey*. PLoS ONE 11(3): e0149806. doi:10.1371/journal.pone.0149806

<sup>15</sup> Horton KC, MacPherson P, Houben RMGJ, White RG, Corbett EL. 2016. *Sex Differences in Tuberculosis Burden and Notifications in Low- and Middle-Income Countries: A Systematic Review and Meta-analysis*. PLoS Med 13(9): e1002119. doi:10.1371/journal.pmed.1002119

technical partners or HHISP to assist their local coordination and communication. In NCD there is a designated TB coordinator, supported by the NCD executive management team.

A further lesson learned from Daru is that the WP Core Group is very important to the success of the TB response. In WP it needs a stronger strategic focus given new players in WP and DGH, the absence of designated TB leadership at provincial level, the fragility of sustainability of the TB response and the complexity of the WP roll-out. In NCD there are appropriate regular meetings with implementing partners but there is also a complex partnership model in NCD that, given the experience in Daru, will require possible additional coordination mechanisms.

An example in NCD is the disconnect between community-based services and PMGH paediatric TB outpatients, reflecting that stronger governance, management and partner coordination mechanisms are needed. The review team suggests that NDOH, WP and NCD consider jointly developing, with DFAT support, augmented partnership coordination mechanisms for WP and NCD with clear lines of local management accountability, joint planning, and an integrated results framework and M&E. This approach would assist DFAT focusing on its higher-level role of policy dialogue, strategy and monitoring by lessening its engagement in operational issues. Augmented coordination could include an annual TB technical exchange workshop (involving other provinces as relevant) to share and build on knowledge and lessons learned and from which integrated annual plans and M&E frameworks for implementing partners in NCD and WP could be generated. In addition, an independent review of DFAT TB investments is suggested, at least each two years, against the strong and integrated monitoring and evaluation frameworks envisaged.

In WP biosecurity issues were a grave issue in 2011 when the GOA TB investment began. Biosecurity issues appear to be now managed effectively through the Health Issues Committee of the Joint Advisory Committee of the Torres Strait Treaty. However, WP incurs sometimes high transport costs from Treaty villages if people cross first to a Queensland Health facility and then are retrieved by WP. The review recommends this is examined.

#### Data and Research

There is a wealth of accurate data in Daru, but it is not yet integrated into the local or national health system. This is a work-in-progress and should be accelerated. Related to this is that data ownership is sensitive due to past ambiguities. Sensitivities could potentially limit the excellent data, analysis and monitoring gains to date including locally-led research. There is a WP Data Utilisation Agreement and a WP Data Transition Plan. Both need formal agreement as a matter of urgency, including agreeing the associated funding and technical issues. In NCD data is being collected separately by partners and there may be similar potential future difficulties. As input to the roll-out of the new electronic platform in NCD, an independent assessment in NCD of data ownership, use and access may be wise.

Research should continue to be a strong focus in DFAT-supported TB investments led by PNG health leaders with the support of technical partners, to inform the continuing TB response in PNG and to contribute to global knowledge. Building local capacity for research should continue to be part of DFAT-funded support and continually strengthen. DFAT may wish to consider supporting a proposed annual TB-specific research forum, which is currently under discussion. The specific aims could be to (i) develop a TB research agenda, agreed by all, for, say the next three years including (ii) a capacity development plan for its achievement, and (iii) with the research agenda and capability development plan reviewed and updated annually, building on the current DFAT-funded, Burnet delivered SORT-IT course. This process and outcome would remove the current concern of some about who is doing what research for what purpose using whose data. It would achieve full transparency on all TB-related research in PNG within a focused and cohesive approach.

#### DFAT support 2020 and beyond

This review notes (i) the gravity of the TB situation in PNG and its profound potential to undermine social and economic development in PNG as well as biosecurity risks; (ii) that the data signals both

world-class achievement and that there is no room for complacency - to have an appreciable impact on controlling or ending the TB epidemic sustained effort is needed for at least the next 7-10 years; and (iii) future DFAT TB support must align with key GOPNG policies and plans including the new national TB plan from 2020 and the DFAT Health Portfolio Plan (HPP). A well-designed DFAT-funded TB program for support to GOPNG for 2020 and beyond with a strong, integrated monitoring and evaluation framework is proposed. The geographical focus of future DFAT support should continue to be national, WP and NCD at the least. Any expansion to other geographical areas should be guided by (i) PNG need based on the analysis that will underpin the development of the new GOPNG national TB plan in Q2 and Q3 2019, and (ii) available DFAT funds so as not to dilute current effort. The DFAT TB investment design from 2020 should have a cohesive approach incorporating, or transparently linking to, all DFAT TB investments in PNG including for national, WP, NCD, WHO, research, laboratories/testing, the DFAT co-funded activities through the WB loan and any other TB investments.

The review notes the importance of maintaining continuity of the TB response. There should be no gap between current DFAT-funded efforts - some finish in September 2019 and others in December 2019 - and the start of the new investment period in 2020. The review also notes, however, that the next national TB strategic plan is not anticipated until September 2019 at the earliest and that it will be a key input to the DFAT investment design including any expanded geographical focus and that the new design will need to align with the national TB plan. Suggestions for 2019 as inputs to prepare for the new DFAT TB design are in the recommendations below.

### **Recommendations**

The recommendations are presented below within six broad strategies, are based on the review findings and draw on lessons learned (see Section 3). The recommendations require the decision or agreement of GOPNG at national, provincial or hospital level working in partnership with DFAT and with DFAT support, and then supporting actions by local PNG leaders, DFAT and the DFAT-funded implementing partners. Once decisions are taken by NDOH, WP, NCD (etc.) the DFAT implementing partners should be requested to adjust their 2019 work plans and those beyond, to support implementation of the recommendations.

### **TB and Health System Strengthening**

- 1. Maintain the focus, intensity and financial support of the TB emergency response and do so in a way that increasingly invests in strengthening the underlying health system for sustainability in containing and reversing TB:**
  - i. Develop Daru and NCD as centres of excellence including training sites for clinical management of MDR-TB and operational research.
  - ii. Build in early adoption of changing evidence-based practice across PNG (such as all-oral short MDR-TB treatment regimens and treating latent TB) in the new National TB plan from 2020.
  - iii. Fast-track TB elimination in feasible locations (such as Daru Island) in the new National TB plan from 2020.
  - iv. Consider opportunities for using the excellent TB outreach platform to strengthen integrated primary health care including immunisation as the TB response matures, starting in Daru from 2019.
  - v. Develop a national policy and guidelines on TB infection control based on the patient journey in community care and in hospitals including the training of multidisciplinary health care workers, community and patients in 2019.

- vi. Link TB initiatives with the DFAT co-funded (with ADB) Health Services Sector Development Program (HSSDP) where appropriate, such as data management and leadership and management development of national and local PNG TB leaders from 2019.

### **Effectiveness and Efficiency**

#### **2. Implement a set of actions and adjustments that will increase the effectiveness and efficiency of current national, provincial and DFAT funding for TB in WP and NCD to maximise outcomes.**

- i. Develop a targeted strategy to support implementation of the new 2019 WHO TB guidelines including capacity building and strengthened compliance monitoring.
- ii. Establish a standard of same-day return of GeneXpert tests results beginning in WP (DGH) and NCD (PMGH and NCD community centres) in Q2 2019 (informed by root cause analyses of current delays, provide additional GeneXpert machines where required or their redistribution and training) from Q2 2019. .
- iii. Strengthen continuous professional development in TB including for all senior health people – managers, medical, nursing - soon after their appointment.
- iv. Establish and strengthen referral and patient tracing mechanisms from PMGH TB outpatients (adult and paediatric) to community-based care and outreach and between the three community-based NCD services drawing on lessons learned in Daru, commencing in Q2 2019.
- v. Review the effectiveness and impact of mobile TB screening in Daru in Q2 2019 to guide future systematic TB screening in WP and NCD (and elsewhere in PNG as appropriate), with a view to a strong systematic approach in both WP and NCD purposefully targeting high-risk groups with speedy rollout to all the population including GeneXpert Ultra for more sensitive testing and offer TB preventative therapy to those infected.
- vi. Implement first and second line LPA testing at CPHL to move away from using Queensland testing facilities and initiate patients on appropriate treatment regimen based on sensitivity patterns in Q1 2019.
- vii. Review efficiency opportunities for TB home visits in Daru and NCD, including the treatment supporter system, in Q2 2019.
- viii. Review the effectiveness of patient enablers (meals, food vouchers and bus fares) in improving patient adherence.
- ix. Update drug ordering to reflect new WHO guidelines and support and monitor to decrease risk of over or under supply from Q2 2019.
- x. Analyse TB bed utilisation needs at DGH given the WP TB response roll-out, in 2019.
- xi. Conduct a root cause analysis of the high LTFU in NCD to support both strengthening and accelerating the TB response, in Q2 2019.

### **Leadership and Governance**

#### **3. Strengthen the leadership and management of the TB response in WP and NCD to ensure that all partners are working well together towards agreed high level targets and indicators and common objectives.**

- i. Strengthen the strategic focus of the WP Core Group and its use of data for monitoring from Q2 2019.



- ii. Fill the WP provincial TB leadership position.
- iii. Analyse and augment where needed implementing partner coordination mechanisms for NCD and WP in Q2 2019 including (i) ensuring clear lines of local management accountability, and (ii) developing processes for joint annual planning of implementing partners with an integrated results framework and strong M&E and (iii) consider an annual TB technical exchange workshop (involving other provinces as relevant).
- iv. Capitalise on HSSDP initiatives including all key players participating in its governance, leadership and management development programs from 2019.

#### **Data and Research**

#### **4. Invest in enhanced data collection and analysis for a data-informed approach nationally and locally to guide planning, monitoring and implementation and continuous improvement.**

- i. Formalise and implement the WP Data Utilisation Agreement and WP Data Transition Plan in Q1 2019.
- ii. Assess data ownership, access and use in NCD to ensure no similar issues to WP, in Q2 2019.
- iii. Conduct economic analyses of the TB response annually in WP and NCD and monitor trends from 2019, complementing the optima decision science tool.
- iv. Incorporate investment in enhanced data collection and analysis in the new national TB strategic plan to be developed in 2019.
- v. Support an annual TB research forum to develop a rolling three-year TB research agenda, agreed by all and a capacity development plan for its achievement, both to be reviewed and updated annually (from 2019).

#### **Gender and Social Determinants**

#### **5. Invest in better understanding the social and gender dynamics around TB infection and health seeking behaviour to guide targeted interventions.**

- i. Ensure all data are sex disaggregated and used for all reporting and monitoring, from Q2 2019.
- ii. Invest further in studies, research and analyses to understand (i) whether the demographic profile of those diagnosed with TB matches the profile of those infected with TB and (ii) the TB health seeking behaviours of men and women from 2019.

#### **6. Advocate for funding for investments with long term impact on TB fundamentals: investments in the underlying social determinants that create an environment where TB flourishes.**

- i. Engage with the commercial sector for their support to GOPNG to reduce crowded housing and improve living conditions in WP and NCD (from 2019).
- ii. Consider embedding health improvement initiatives in all DFAT economic programs and discussing a cohesively similar and synergistic approach with development partners (from 2019).

## Future DFAT Support

- 7. Given the gravity of the TB situation in PNG, DFAT continue its TB support for 7-10 years using a comprehensive program approach incorporating all DFAT TB funding, with a clear, integrated results and monitoring and evaluation frameworks, clear management and accountability arrangements, and strong focus on local leadership.**

In addition to the recommendations above, DFAT consider, in 2019, as **inputs** to the proposed 2020-2025 DFAT TB investment design:

- i. Reducing LTFU in NCD
  - Commission an analysis of (i) the disconnect between PMGH paediatric and adult outpatients and community-based services and outreach in NCD in Q2 2019, and (ii) providing expert resources to develop efficient referral mechanisms in Q2/3 2019.
  - To support this, invest in the Child Fund TB Project at PMGH to provide training on TB paediatric care to community-based implementing partners in NCD during 2019 and beyond.
  - Include in implementing partner discussions in NCD, and in contracts as required, the need for interdependence across boundaries for patient flows and good referral mechanisms including between community-based services and they and PMGH to aid service coordination and the patient journey.
- ii. Use the planned Daru and NCD behavioural study led by the PNG Institute of Medical Research to inform the proposed design.
- iii. Assess DGH infrastructure improvements possibilities including staff accommodation.
- iv. Commission a root cause and economic analysis on patient flow to maximise TB X-ray efficiency in PMGH.
- v. Commission a root cause analysis towards achieving GeneXpert same day turn-around-time of test results (community and hospitals).
- vi. Require integrated annual planning and M&E of the implementing partners in WP and in in NCD.
- vii. If the WP TB leadership position remains unfilled, designate one of the three implementing partners to act as local leader of the WP implementing partners in the interim.
- viii. Request relevant implementing partners to include TB training for multidisciplinary staff along the patient journey in hospitals in their 2019 work plans.
- ix. Review the cost imposts on WP for patient transfers from Queensland Health facilities such as those nearby in the Torres Strait.

# 1. INTRODUCTION .

## 1.1. Purpose

This is the report of the 2018 independent review (the review) on the investment of the Australian government (GOA) in tuberculosis (TB) in Papua New Guinea (PNG) (Annex 1, *Terms of Reference*). The review was commissioned by the Australian Department of Foreign Affairs and Trade (DFAT) through which the GOA investment was made. TB is a major public health problem in PNG and a global public health concern. TB is one of the seven program priorities in the PNG National Health Plan (NHP) 2016-2020 and reducing the burden of communicable diseases is one of its eight key result areas. In 2014 GOPNG declared an emergency TB response with three ‘hot spots’: Western Province (WP), Gulf Province and the National Capital District (NCD).

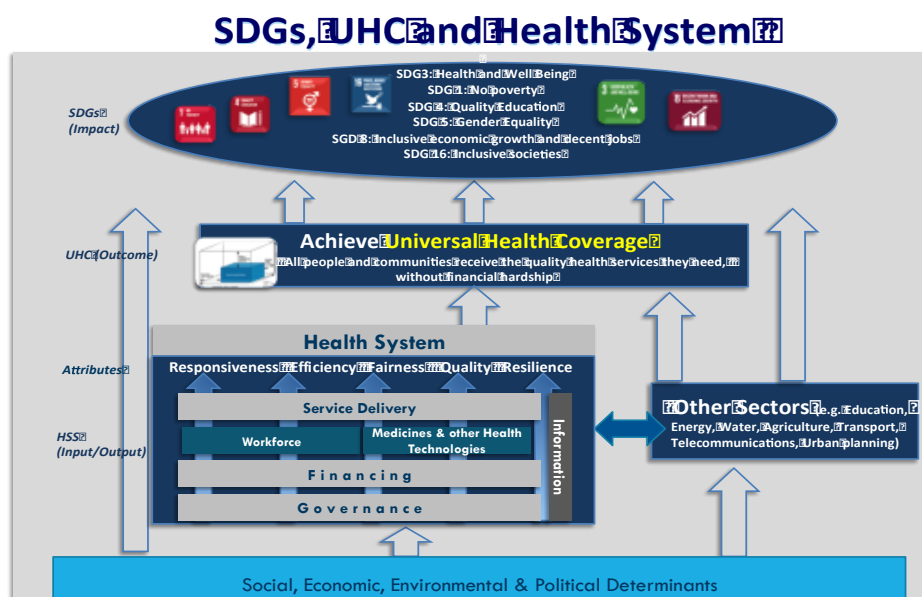
The purpose of the review was to (i) assess the contribution or attribution of GOA investments to achievements in TB prevention and control in PNG since the investment commenced in 2011, and (ii) identify lessons learned to inform future DFAT investments in TB in PNG. The review team visited PNG (Port Moresby, NCD and Daru, WP) between 2 and 14 December 2018.<sup>16</sup>

The report is presented in four main parts: introduction and overview including the review objectives, methodology, and description of TB in PNG and of GOA TB investments in PNG; analysis and findings; lessons learned; and recommendations.

## 1.2. Review Methodology Framework

The review team methodology included document reviews and consultations, contribution and attribution analyses, and complexity and design theory, the triangulating of information and data received wherever possible, and other analysis (Annex 2, *TB Review Plan* and Annex 3, *People Consulted*). The review took a systems approach to sustainability, recognising the interrelatedness of the sustainable development goals (SDGs), universal health coverage (UHC) and health system strengthening (HSS), for sustainability. Figure 1 illustrates.

**Figure 1: SDG’s UHC and Health Systems**



Source: World Health Organisation UHC Technical Advisory Group Western Pacific Region 2018

<sup>16</sup> The members of the independent review of the GOA TB investment in PNG were Gillian Biscoe AM (team leader), Hind Satti (TB expert), Kim Dalziel (finance and economic analytics) and Madeline Lemeki (gender and social inclusion); the review team received invaluable support from Martin Taylor (senior health consultant) and Iran Yanda (DFAT health intern); Dr Satti participated virtually during the December in-country visit as a visa was unable to be achieved in the time frame of the review.

Table 1 below illustrates an analytical framework that also assisted the review team given there are multiple interdependent, hierarchical elements of a response to a disease outbreak.

**Table 1: Analytical Framework**

| Hierarchy of levels        | Interdependent elements  |
|----------------------------|--|
| Strategic intent           | <ul style="list-style-type: none"> <li>▪ <i>Health policy</i></li> </ul>   |
| Structure                  | <ul style="list-style-type: none"> <li>▪ <i>Delivery system: availability, organisation, financing</i></li> <li>▪ <i>Population at risk: predisposing, enabling, need</i></li> <li>▪ <i>Environment: physical, social, economic</i></li> </ul> |
| Process                    | <ul style="list-style-type: none"> <li>▪ <i>Realized access: utilisation, satisfaction</i></li> <li>▪ <i>Health risks: environmental, behaviour</i></li> </ul>   |
| Intermediate outcomes      | <ul style="list-style-type: none"> <li>▪ <i>Effectiveness: clinical, regulation</i></li> <li>▪ <i>Equity: procedural, substantive</i></li> <li>▪ <i>Efficiency: production, allocative</i></li> </ul>  |
| Ultimate outcome or impact | <ul style="list-style-type: none"> <li>▪ <i>Health: individuals, community</i></li> </ul>  |
| Strategic intent           | <ul style="list-style-type: none"> <li>▪ <i>Health policy</i></li> </ul>   |

Source: Lairson et al. 1999. *A Framework for Assessing the Effectiveness, Efficiency, and Equity of Behavioral Healthcare*. The American Journal of Managed Care.

The review was informed by the higher order goal of Australia and PNG government relationships and key PNG government (GOPNG) and GOA policies and strategies, key GOPNG and GOA documents and by core technical documents. Over 240 documents were accessed by the review.

Key GOPNG documents included the GOPNG Vision 2050 and Strategy Plan 2010-2030, the PNG National Health Plan 2011-2020 including a key result area to reduce the burden of communicable diseases, the National Strategic Plan for Tuberculosis 2016-2020 and relevant WP and NCD provincial plans.

Key GOA documents included the 2017 Foreign Policy White Paper, the 2018–19 Department of Foreign Affairs and Trade Corporate Plan, the 2014 DFAT Making Performance Count, the 2015 DFAT Health for Development Strategy, the 2016 DFAT Gender Equality and Women’s Empowerment Strategy, the 2016-2020 DFAT Strategy for Strengthening Disability Inclusive Development in Australia’s Aid Program, the 2017 DFAT Monitoring and Evaluation Standards, the 2018 DFAT PNG Health Portfolio Plan (HPP) and the 2012 DFAT Strategy Paper on TB for support to the PNG government. Annex 4 (*Selected Background Documents*) contains a representative selection of the documents that informed the review.

Data sources included the routine reporting to the PNG National TB Program (NTP), the 2016 and 2018 World Health Organisation (WHO) Regional Green Light Committee Reviews (rGLC), the WHO 2017 TB Epidemiological Review and Impact Analysis of Tuberculosis in Papua New Guinea, the 2018 WHO Global TB Report and other reports and analysis, and consultations.

### 1.3. Australian Government Support

#### 1.3.1. Objectives

The objective of the Australian government in the DFAT 2012 PNG TB Strategy Paper was to support the Government of PNG to significantly reduce morbidity and mortality from TB and MDR-TB in South Fly District (SFD) in Western Province (WP) and the Torres Strait, through sustained quality TB control and strong cross border coordination. Also in 2012 the GOA then Minister for Foreign Affairs announced targets of up to 80% early detection in WP and treatment success of 85%.

The GOA TB investment began in Daru, WP in 2011 and in NCD in 2016/2017.<sup>17</sup> The investment objective and targets align with the PNG 2016-2020 National Health Plan (NHP) to reduce the burden of communicable diseases and with the National TB Strategic Plan (NTBSP) for Papua New Guinea 2015-2020, including the emergency response from 2014. The NTBSP includes an objective of improving the quality of diagnostic and treatment services and has 2020 targets for case notification and treatment success of 93 per 100,000 population and 88% respectively.

### 1.3.2. Financing

GOA (through DFAT) has been the lead external financier of activities to address TB in PNG since the investment commenced in 2011. The GOA investment since 2011 is AUD60m. AUD54m has been expended to date and the balance will be expended this financial year (2018/2019) (Annex 5, *DFAT Investment in TB in PNG*). GOA also provides significant support to the TB (and other) work of the World Health Organization (WHO) in PNG, to the Global Fund to Fight AIDS, TB and Malaria and is the co-financier of a World Bank (WB) loan to PNG (the first for 14 years) for TB.

The WB USD15 million Emergency TB Project (ETP) loan was activated in 2018. The Australian government committed approximately AUD20 million (subject to exchange fluctuations) to match WB funding. Of this matching commitment up to AUD8/USD6 million will be co-financed and will be available to augment the WB-provided loan funds and allocated against loan work plans. These funds will be managed by the NDOH and WB under the loan planning, allocation and acquittal processes. There is a further approximately AUD12/USD9 million in parallel financing that DFAT will manage that is separate to the loan.

Other than the WB loan co-funding, the bulk of the current DFAT investment in TB in WP and NCD finishes between September and December 2019. Any gap between the current funding finishing and the proposed new DFAT investment starting poses a risk to the response.

DFAT is also co-funding (with the Asian Development Bank [ADB]) the Health Services Sector Development Program (HSSDP), a major health system strengthening strategy which will assist containing the TB epidemic in the longer term as well as much else, over time.

### 1.3.3. Design

A feature of the DFAT TB investment in PNG is funding not-for-profit technical partners to support GOPNG implementation rather than managing contractors (Annex 5, *DFAT TB Investment in PNG*). The result is technically strong and innovative, including the initial MDR-TB focus in Daru. Partly as a result of the incremental nature of the initial TB investment and the urgency of the TB emergency response from 2014 there is no programmatic design or monitoring and evaluation (M&E) framework for the DFAT TB investment in PNG. There is a relatively structured approach in NCD building on lessons learned from Daru and elsewhere.

The review therefore (i) was guided by the 2017 DFAT generic M&E framework and (ii) derived ten (10) crosscutting themes from key relevant PNG and Australian governments' policies and plans which include the 2012 DFAT PNG TB strategy. The DFAT generic M&E framework is *relevance, effectiveness, efficiency, impact and sustainability, gender and social inclusion, and governance, management and partner coordination*. The crosscutting themes derived by the review from key documents are *strengthened health systems and services, rural focus, gender and social inclusion, and data and information* and, from the 2012 DFAT TB Strategy, *phased support (short, medium, long term), improved primary health care, supporting leadership by the PNG Government, a sustained cross border initiative, and regular review and independent monitoring of progress*.

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<sup>17</sup> In Gulf Province the TB response has been coordinated by Médecins Sans Frontières.

## 1.4. TB in PNG

### 1.4.1. Epidemiology

Tuberculosis including multi drug resistant TB (MDR-TB) is a major public health problem in PNG and remains a global public health concern. PNG is one of the 30 high drug-susceptible TB (DS-TB), MDR-TB and TB/HIV burden countries in the world.

The TB incidence in PNG is 432/100 and multidrug-rifampicin resistant tuberculosis (RR/MDR) is 23/100,000.<sup>18</sup> TB is a leading cause of death in PNG with mortality of 53/100,000. Extensively drug resistant TB (XTR-TB) also exists and primary transmission has been reported. The estimated incidence of TB in children in PNG is high at around 25% of all children, compared with international figures of 10%. An estimated 791 (7%) of 27,934 people who developed TB in 2017 were HIV-positive and of these 753 (95%) were on retroviral therapy.<sup>19</sup>

PNG is a lower middle-income country and, while the government is prioritising health and education, the TB epidemic in PNG is compounded by areas of poverty and illiteracy, and a weak health system. Poverty and illiteracy influence the overall health status of an individual and population including because of mal- or under-nutrition and weak health seeking behaviours and thus timely access to health care. PNG's weak health system results in delays in TB diagnosis, inadequate and ineffective TB treatment and also influences health seeking behaviours. There are other poor social determinants of health and wellbeing in PNG including inadequate or non-existent sanitation and overcrowded housing, particularly in the informal settlements.

### 1.4.2. TB Emergency

In 2014 the government of PNG declared a national TB public health emergency, triggered by a documented outbreak of MDR-TB in South Fly District (SFD) in WP with 44% of new MDR-TB cases, implying primary transmission of resistant strains of TB in the community (noting that TB data reliability in Daru at that time was uncertain). Approximately 25% of new TB patients were MDR-TB in 2013/2014 and 34% in 2016. Molecular epidemiology studies by Bainomugisa, Lavu et al in 2018 showed MDR-TB strain clonal outbreak.

In response to the national TB emergency, Australian government support for TB increased rapidly, first nationally (e.g. NDOH, WHO, laboratories) and in Daru, and in NCD from 2016/2017.

NCD has 25% of the known TB burden in PNG while only 5% of the population (364,125 population at the 2011 Census).<sup>20</sup> NCD is an amplification risk given its fluctuating population from other provinces, large number of overcrowded settlements and the known TB burden. WP is the largest and most sparsely populated of PNG provinces while Daru Island, 15 kilometres long, and its main town Daru is crowded - the population on the island was 15,142, 000 in the 2011 Census. There is a biosecurity risk in WP due to its close proximity to Australian and Indonesian borders.

The 2016 and 2018 rGLCs showed that while there is progress the TB situation overall in PNG remains complex. The 2018 rGLC found there were (i) increases in case notifications,<sup>21</sup> (ii) improvements in TB treatment close to 80% and reductions in deaths and loss to follow up in both drug sensitive (DS) and

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<sup>18</sup> In high burden TB countries 'DS-TB' is usually referred to simply as 'TB'; in this report 'DS-TB' is used to clarify and distinguish between MDR-TB or XDR-TB.

<sup>19</sup> WHO Global TB Report 2018.

<sup>20</sup> Civil registration data is weak in PNG.

<sup>21</sup> 'TB notifications' are the number of new and relapse TB cases notified in a given year, per 100 000 population to the national surveillance system and then on to WHO. An increase may indicate improved reporting and case detection with an increase in the early years of the program with a longer-term decrease in the number of cases identified as the program and screening is strengthened.

MDR-TB, (iii) stable level of new cases of MDR-TB but also (iv) a high number of new cases of MDR-TB with no contact to existing patients suggesting many primary cases, high 'latent TB'<sup>22</sup>.

The quality of data from Daru improved from 2014/2015 with additional demographic data, patients' address, laboratory investigations and various process indicators. As the DFAT-supported NCD response is newer (2016-2017) less data is currently available. Data is being strengthened in NCD including through eHealth initiatives in progress.

#### 1.4.3. Health System Issues

In PNG's health system there is weak health financing, low budgets and intermittent disbursements. There is also a health workforce crisis (quantity and quality) and crumbling health infrastructure, including Daru General Hospital (DGH) and some community health centres in NCD.

To strengthen the PNG health system, there is a significant decentralisation reform in progress. New Provincial Health Authorities (PHAs) are being established as a whole-of-PNG health system strengthening strategy. WP is moving towards a PHA and NCD has its own version given its unique nature as the National Capital District. The DFAT and ADB co-funded HSSDP has a range of integrated health system strengthening initiatives including health financing policy, eHealth, drug supply chain, infrastructure, and governance, leadership and management development for the health system in the newly decentralising environment. Health system strengthening will be of benefit to containing and effectively managing the TB epidemic – as well as to the PNG health system overall - over time.

### 1.5. DFAT's TB investments and approach

#### 1.5.1. Overview

DFAT is the key external financier of the GOPNG-led TB emergency response and has invested in TB in PNG since 2011 focusing first on Daru in WP and from 2016/2017, NCD (Annex 5, *DFAT TB Investment in PNG*). The urgency of the response and the consequent absence of a programmatic design and overarching, integrated monitoring and evaluation framework, and the model of various implementing partners, have contributed to some challenges in creating a cohesive whole of the various DFAT TB investment streams and some management and coordination challenges. Manifestations include some disconnects between partners in NCD and Daru as well as greater operational engagement by DFAT from time to time than might be desirable, an opportunity cost to DFAT's higher-level role of policy dialogue, strategy and monitoring support to GOPNG. The GOPNG provincial TB coordinator position in Daru is vacant which is accentuating challenges there and in NCD, because of the newness of the strengthened response, some disconnects are apparent.

Given that much of the DFAT TB funding ceases in September and December 2019, the time line is tight to achieve a robust design and mobilisation from 2020, ensuring continuity and maintaining momentum in what remains a TB epidemic in PNG. The review has therefore provided a range of recommendations at the end of this report as inputs to the design to assist purposeful progress.

#### 1.5.2. Western Province

In WP leadership of the TB response is through the WP Core Group but the WP TB coordinator position is vacant, creating a leadership gap (see section 1.9.8 below). There are two DFAT-funded implementing partners and strong support from the DFAT-funded Health and HIV Implementation Services Provider (HHISP). The Burnet Institute (Burnet) supports hospital clinical/technical TB excellence, community clinical/technical TB excellence (e.g. paediatric prophylactic treatment,

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<sup>22</sup> 'Latent TB' is defined by the US Centre for Disease Control as people who are infected with TB but do not feel sick nor have any symptoms. Persons with latent TB infection are not infectious and cannot spread TB infection to others. Without treatment about 5-10% of those infected with TB but with no symptoms will develop TB disease at some time in their lives, about 50% within the first two years of infection.

<https://www.cdc.gov/tb/publications/factsheets/general/ltbiandactivetb.htm>

contact tracing), data and information, and research. World Vision (WV) focuses on establishing and supporting strong best-practice community-based treatment and TB screening implementation in Daru. Burnet also provided critical, innovative, hands-on hospital MDR-TB support early in the emergency response. HHISP provides logistical and operational support services as well as high level technical support to the WP provincial health office (PHO).

Daru General Hospital (DGH) operational funding is the responsibility of GOPNG but funding is limited. Some DFAT support was provided to DGH for essential TB-related operational costs (mainly through HHISP). The DGH building is in a very poor state – other than the DFAT-funded TB facilities, while strong local management initiatives have improved the environment as best as possible. DFAT funding built a new MDR-TB ward and isolation rooms at DGH, essential factors in the early success of the response, and an outpatient cough clinic. The standard of these facilities is in stark contrast to the one overcrowded ward for all other patients accentuating staff dissatisfaction with non-TB DGH facilities. Australia also previously funded a DGH Master Plan around 2012. The master plan is both ambitious and probably out-of-date but does provide some guidance to DGH infrastructure needs for the future: they are many.

A feature in WP is its proximity to Australia and Indonesia and consequent biosecurity risks. WP biosecurity issues appear to be managed effectively through the Health Issues Committee of the Joint Advisory Committee of the Torres Strait Treaty. The review recommends that the cost imposts on WP for patient transfers from Queensland Health facilities such as those nearby in the Torres Strait be examined.

#### 1.5.3. National Capital District

In NCD leadership of the TB response includes an NCD TB coordinator. The organisation of the response is based on the three NCD administrative districts - Moresby North East, Moresby North West and Moresby South. Each district has a separate DFAT-funded implementing partner for the community-based response - WV, FH1360 and the Child Fund. Médecins Sans Frontières (MSF) is the implementing partner working with the Gerehu Hospital.

An additional complexity in NCD compared to Daru is that Port Moresby General Hospital (PMGH) has the largest known cohort of TB patients in PNG. PMGH has approximately 6,000 TB patients per year and does approximately 3,200 X-rays per month, creating a diagnostic bottleneck for non-TB patients. DFAT is funding an additional X-ray machine in 2019 under the Child TB Project. Its impact on patient flow improvement should be independently reviewed. There is a lack of connectedness between PMGH and the community-based response for outpatient treatment, with PMGH running its own large adult and paediatric TB outpatient clinics but having no outreach or contact tracing services and little apparent connectedness for referrals to the community-based services. The view of the review team is that all PMGH TB outpatients, adult and paediatric, should be discharged to community care and outreach providers rather than PMGH develop its own community-based services as was being discussed locally during the review.

The Child TB Project managed by the Paediatric Society of Papua New Guinea at the PMGH has trialed a new, more palatable paediatric TB formula on 1500 children for the last two years. This is now being mainstreamed across PNG, funded by GOPNG. This is an outstanding return-on-investment of GOA TB funding. The Child TB Project could be commissioned to provide community-based TB paediatric training to the implementing partners in NCD.

#### 1.5.4. Other DFAT TB investments

DFAT TB investments in PNG also include (i) the TB work of WHO, a critical GOPNG partner in the TB emergency response including for setting national technical standards and protocols and co-chairing the national response with the National Department of Health (NDOH), (ii) laboratory support through the Queensland Mycobacterium Reference Laboratory (QMRL) and laboratory TB testing in PNG, locally in WP and NCD as well as nationally through the Central Public Health Laboratory (CPHL), (iii)



the Child TB Project at Port Moresby General Hospital (PMGH) and (iv) cross-border biosecurity initiatives between Australia and GOPNG/WP.

The GOA matched and parallel funding to the WB loan (see section 1.3.2 above) is an important new TB investment by GOA. Its impact includes additional funding for and increased expertise to the health sector in PNG and increasing the skills of NDOH to engage with multilateral development banks and for its interactions with GOPNG central agencies. A consequence is the widening of the profile of health and TB among PNG policy makers - their sustained engagement is critical to the continuing effectiveness of the TB response. And see Annex 5, *DFAT TB Investment in PNG*.

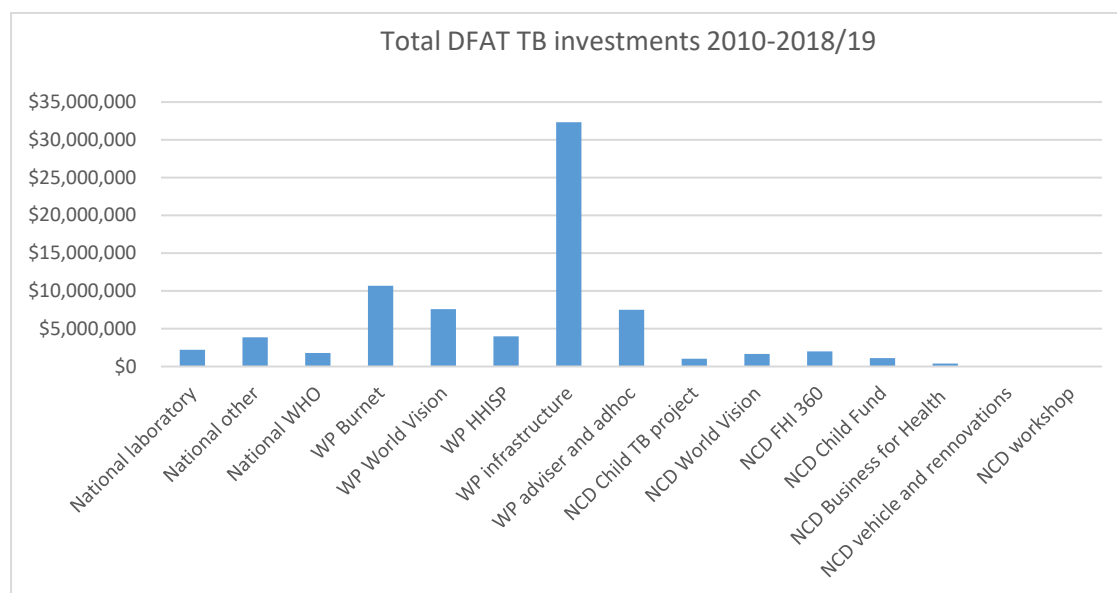
#### 1.5.5. DFAT-supported TB personnel

The number of personnel supported by DFAT-funding has varied over the years but just prior to the review there were 23 locally engaged staff, 4 international advisers and incentives paid to some GOPNG staff as an essential recruitment strategy in Daru. The DFAT-funded TB response also includes volunteers in the community-based TB services in both Daru and NCD.

#### 1.5.6. Expenditure

DFAT expenditure on TB in PNG was AUD17.6m in 2016/17, AUD20m in 2017/2018 and at least AUD11.8m in 2018/2019 (HHISP projections). Included in this expenditure was over \$30m towards infrastructure, including the MDR-TB wing and outpatient TB diagnostic centre in DGH and three new community health centres in NCD scheduled to be built in 2019 (See Figure 2 and Annex 5, *DFAT TB Investment in PNG* ).

**Figure 2: Total DFAT TB Investments 2010 – 2018/19**



## 2. FINDINGS

### 2.1. Summary

The DFAT TB investment is seen by all consulted as fundamental to the success of the TB emergency response. The view of senior PNG health leaders is that the response may have collapsed without DFAT’s support. However, to have an appreciable impact on ending the TB epidemic GOA support is needed for at least the next 7-10 years in WP and NCD, and nationally.

DFAT TB support since 2011 has contributed strongly to achieving:

- (i) the *PNG 2016-2020 National Health Plan* objective of reducing the burden of communicable diseases;
- (ii) the *National TB Strategic Plan for Papua New Guinea 2015-2020* objective of improving the quality of diagnostic and treatment services and its 2020 targets for case notification and treatment success of 93 per 100,000 population and 88% respectively - with DS-TB treatment success rate in Daru of 85% in 2017 and MDR-TB of 87.3% in 2016, and a reducing but still high case notification rate; and
- (iii) the 2012 DFAT TB objective to support the Government of PNG to significantly reduce morbidity and mortality from TB and MDR-TB in South Fly/Western Province and Torres Strait, through sustained quality TB control and strong cross border coordination; and
- (iv) the 2012 GOA targets announced by the GOA Minister for Foreign Affairs in 2012 of up to 80% early detection in WP and treatment success of 85%.

With the strong DFAT support and efforts of many, nationally and in WP, it is important to note that while the results to date in Daru are outstanding, world-class, and there is significant progress in improving case finding and treatment of active TB, the TB response is still in relatively early days in Daru and is just beginning in NCD. The early progress in NCD appears to be similar to Daru at the same time of the strengthened emergency response in 2014-2015 noting that data veracity in NCD is uncertain (and is being improved in 2019) and that the NCD context differs – there is a larger population, numerous informal settlements and higher floating population from other provinces.

In line with the 2018 rGLC findings, the review finds that continued DFAT TB investment is needed at least for the next 7 to 10 years for sustainability, and may be needed for longer given high numbers of primary MDR-TB patients; the appearance of reinfection in Daru; the small number of patients on the shorter MDR-TB treatments (11%) in Daru; crumbling health infrastructure; the weak health system with inadequate operational budgets; and the early stage of the strengthened response in NCD.

## **2.2. Technical Analysis**

### **2.2.1. Data sources and issues**

Data was sourced from key data sets including the routine TB reporting to the PNG National TB Program (NTP) and other programmatic sources and reports including the 2016 and 2018 World Health Organisation (WHO) Regional Green Light Committee Reviews (rGLC), the WHO 2017 TB Epidemiological Review and Impact Analysis of Tuberculosis in Papua New Guinea, the 2018 WHO Global TB Report and others. It is too early to use data from NCD for a comprehensive analysis while as previously noted early signs are that NCD is progressing at the same rate as Daru in 2014/2015. Given the Daru experience and lessons learned from it and elsewhere there is no reason why NCD should not also achieve well, notwithstanding its larger population and geographic area, and floating population complexities.

Daru data from 2011-2014 is possibly less accurate than more recent data. For example, prior to 2015 MDR-TB patients were also registered in the DS-TB register and it is not known whether MDR-TB patients were excluded when reporting on DS-TB notifications, which may have resulted in 'double counting'. There is also a variation in the absolute numbers reported – not significant – due to data limitations of the paper-based system particularly prior to 2014. In Daru, the latest full year of data for DS-TB is 2017 and for MDR-TB it is the 2016 TB cohort. Treatment outcomes for MDR-TB for the 2017 and 2018 cohorts are not yet available. Improvements in the quality of data from Daru from 2014 include the addition of demographic data, patients' address, laboratory investigations and various process indicators.

Treatment outcomes in Daru are defined according to the WHO 2014 standardised definitions. The exception is for patients who may have changed two or more TB drugs during the course of treatment due to side effects e.g. Kanamycin to Bedaquiline because of hearing impairment, or para-aminosalicylic acid (PAS) may have been stopped for gastro-intestinal side effects. If these patients were otherwise doing well in terms of clinical progress and bacteriological monitoring, they were not classified as treatment failures.

For the TB case notification rates in Daru, population denominators for the SFD were calculated (Table 2) based on a growth rate of 2.5% per year to the 2011 census figures (2.5% is the previous population growth rate in PNG from 2005-2011).

**Table 2: Estimated Population Denominators Daru, WP**

| Year          | SFD Pop | Daru Pop |
|---------------|---------|----------|
| 2011 (census) | 59152   | 15142    |
| 2012          | 60631   | 15521    |
| 2013          | 62147   | 15910    |
| 2014          | 63701   | 16308    |
| 2015          | 65294   | 16716    |
| 2016          | 66927   | 17134    |
| 2017          | 68601   | 17563    |
| 2018          | 70317   | 18003    |

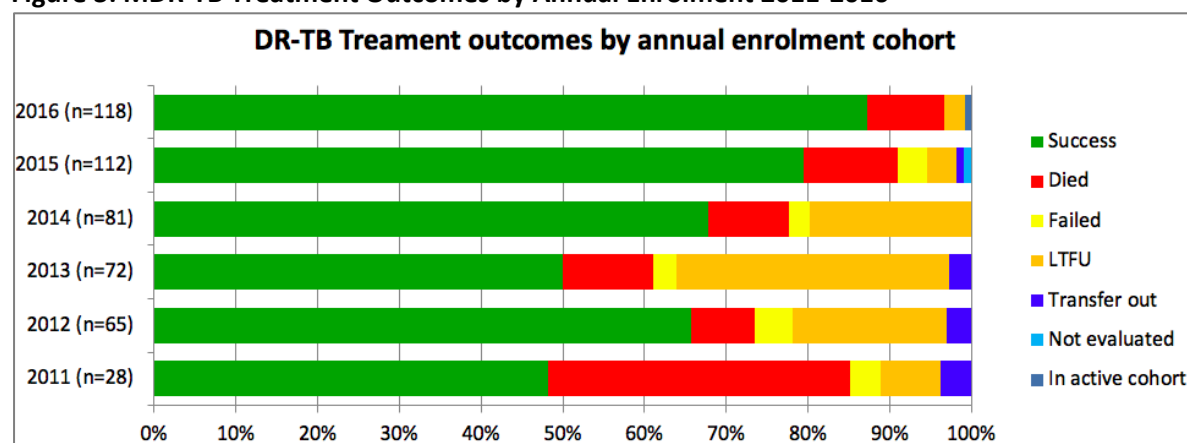
Source: PNG 2011 Census and review team calculations.

### 2.2.2. Treatment Outcomes

There are many successes in Daru including improvements in treatment outcomes and stabilisation of case numbers, but no major decrease in rates. This and the magnitude of the TB epidemic and the socio-economic and health system challenges in PNG underpins the review findings that ongoing DFAT investment is needed over the longer term, say 5-7 years.<sup>23</sup> There is a high proportion of new MDR-TB cases, suggesting ongoing community transmission. To achieve epidemic control more still needs to be done to strengthen active case finding, treatment and scale up preventive therapy.<sup>24</sup>

Figures 3 and 4 provide a summary of the treatment outcomes for the cohorts of TB patients treated in Daru from 2011 to 2016 for MDR-TB and from 2012 to 2017 for DS TB.

**Figure 3: MDR-TB Treatment Outcomes by Annual Enrolment 2011-2016**

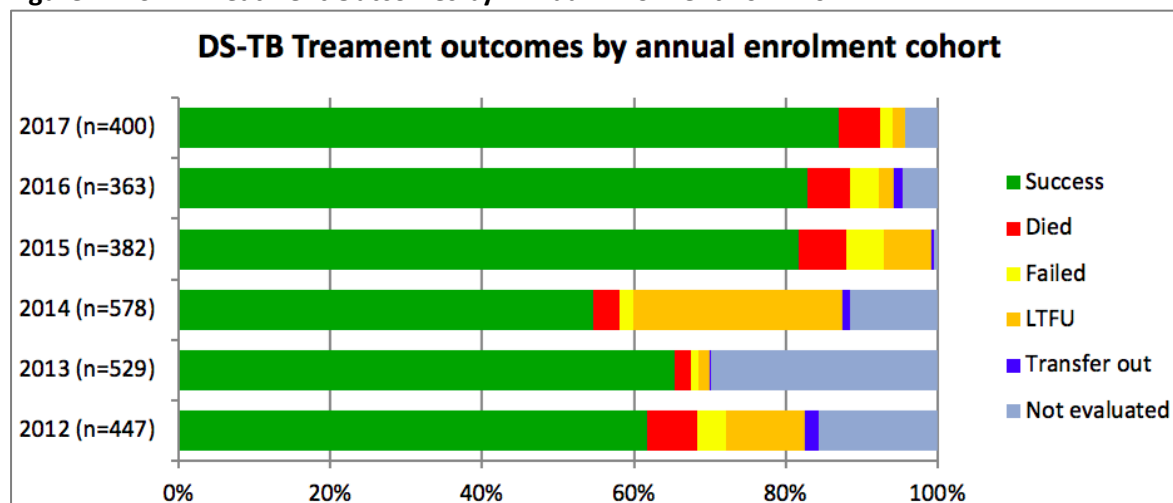


Source: PNG National TB Program (NTP) using the routine reporting system and programmatic data and reports.

<sup>23</sup> This is in line with the recommendation of the 2018 WHO Green Light Committee Review.

<sup>24</sup> Morris et al. 2018. *The Emergency Response to Multi-drug Resistant Tuberculosis in Daru, Western Province, Papua New Guinea 2014-2017* (in press). Papua New Guinea.

**Figure 4: DS-TB Treatment Outcomes by Annual Enrolment 2012-2017**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

For the 2017 cohort, Daru achieved 85% DS-TB treatment success (Figure 4). This is a substantial increase over 2012 and meets the target announced by the GOA then Minister for Foreign Affairs in 2012. For the 2016 MDR-TB cohort, an 87.3% treatment success was achieved in Daru (Figure 3). This is a significant increase over 2011, meets the NTBSP treatment success rate, and is well above the 50% global average for successful treatment of MDR-TB.

Daru has also seen an equally remarkable reduction in loss-to-follow-up (LTFU) of TB patients under treatment. For DS-TB, the LTFU reduced from 27.5% in 2014 to 1.5% in the 2017 DS-TB patient cohort, and for MDR-TB from 18% in the same year, 2014, to 2.5% in the 2016 cohort. This can be attributed to the DFAT-funded innovative community-based intervention and patient-centred approach.

### 2.2.3. Case Notification

Table 3 below presents the time trend in DS-TB and MDR-TB case notification rates in Daru from 2012 to 2018, showing a drop in case notifications. The review notes however the previously discussed possible ‘double-counting’ which may be the explanation for the apparent reduction in cases between 2014 and 2015. The proportion of TB cases that are registered with a Daru address is around 70% of the cohort. However, there may be some inaccuracy due to inconsistencies in the way that patient addresses are solicited and recorded.

The case notification rate (CNR) for all TB in Daru decreased from 1,038 per 100,000 people in 2014 to 784 per 100,000 in 2018. While the absolute figure is still high the decrease is remarkable. MDR-TB cases notified in 2017 and 2018 were steady as a percentage of all cases reported, 20.5%.<sup>25</sup> These are outstanding results.

The stable case notification may indicate a stabilisation of the epidemic in Daru, but this should not be confused with the epidemic ending in the foreseeable future without continuous, sustained effort.

<sup>25</sup> Morris et al. 2018. *The Emergency Response to Multi-drug Resistant Tuberculosis in Daru, Western Province, Papua New Guinea 2014-2017 (in press)*.

**Table 3: Daru Basic Management Unit (BMU) Annual Case Notification Rates (CNR) (per 100,000)**

| Year | All TB CNR                 | MDR-TB CNR              | MDR-TB as % of all TB |
|------|----------------------------|-------------------------|-----------------------|
| 2012 | 846<br>(n=513, 846-3305)   | 109<br>(n=66, 109-425)  | 12.9                  |
| 2013 | 967<br>(n=601, 967-3777)   | 116<br>(n=72, 116-453)  | 12                    |
| 2014 | 1038<br>(n=661, 1038-4053) | 130<br>(n=83, 130-509)  | 12.6                  |
| 2015 | 763<br>(n=498, 763-2979)   | 176<br>(n=115, 176-688) | 23.1                  |
| 2016 | 719<br>(n=481, 719-2807)   | 176<br>(n=118, 176-689) | 24.5                  |
| 2017 | 732<br>(n=502, 732-2858)   | 149<br>(n=102, 149-581) | 20.3                  |
| 2018 | 784<br>(n=551, 784-3061)   | 161<br>(n=113, 161-628) | 20.5                  |

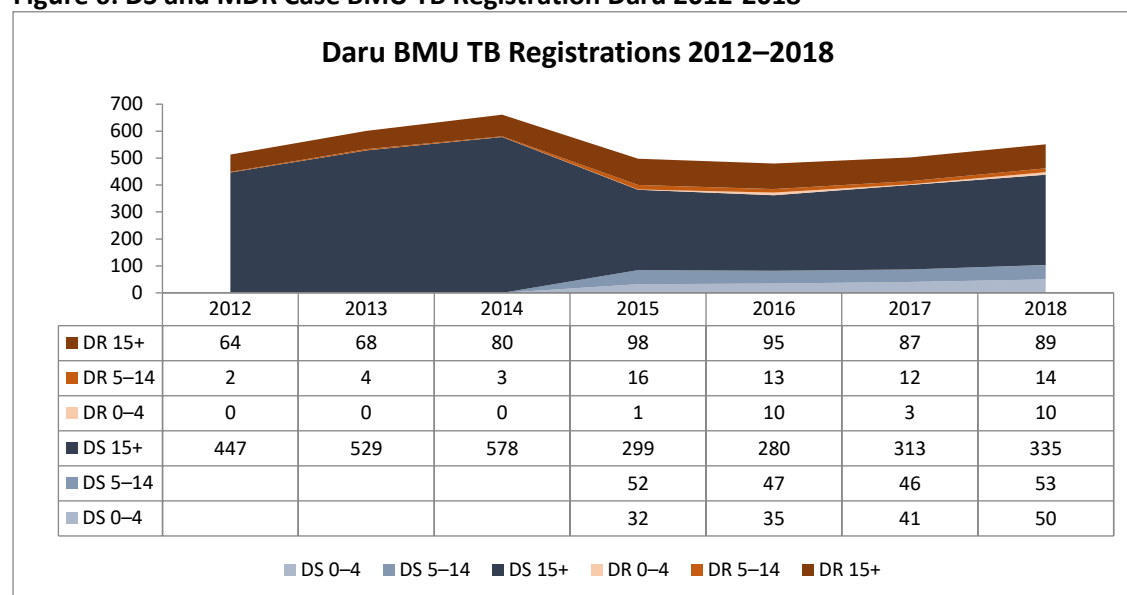
Note: Uncertainty intervals for CNR in brackets with lower bound using SFD population as the denominator and upper bound uses Daru population as the denominator.

Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

Figures 6, 7 and 8 below present the MDR-TB and DS-TB case notification age-disaggregated numbers in Daru from 2012 to 2018. The data demonstrates that MDR-TB case notification increased between 2014 and 2015 and was stable over 2017 and 2018 other than the paediatric MDR-TB case notification. This increased, especially among children aged 0-4 years from 2014 to 2015 but has since stabilised. For DS-TB registrations from 2012-2014 no age disaggregated data was available, so these have all been plotted as cases aged 15+.

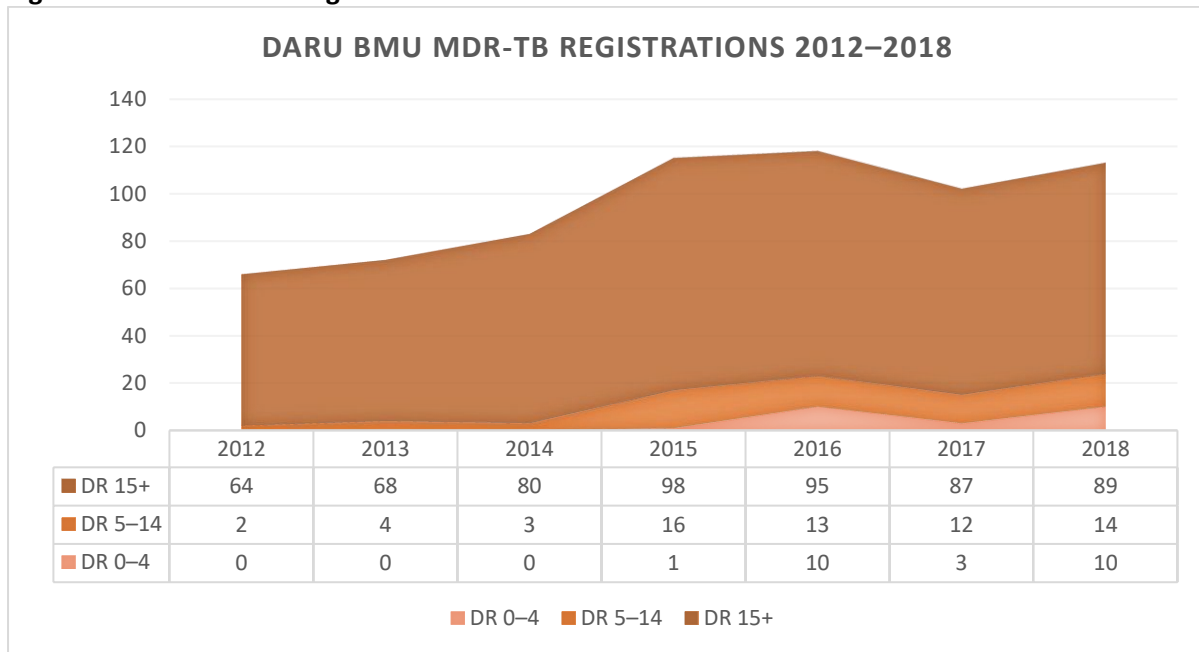
The data indicates on-going community transmission of resistant TB strains. Strong, active case finding, and household contact screening is imperative for early case detection and treatment combined with TB preventative therapy for exposed adult and child contacts to prevent disease. Whilst there is important progress in improving case finding and treatment of active TB however the response to date has not yet had an appreciable impact on ending the epidemic; a longer-term view over the next 7-10 years is needed.

**Figure 6: DS and MDR Case BMU TB Registration Daru 2012-2018**



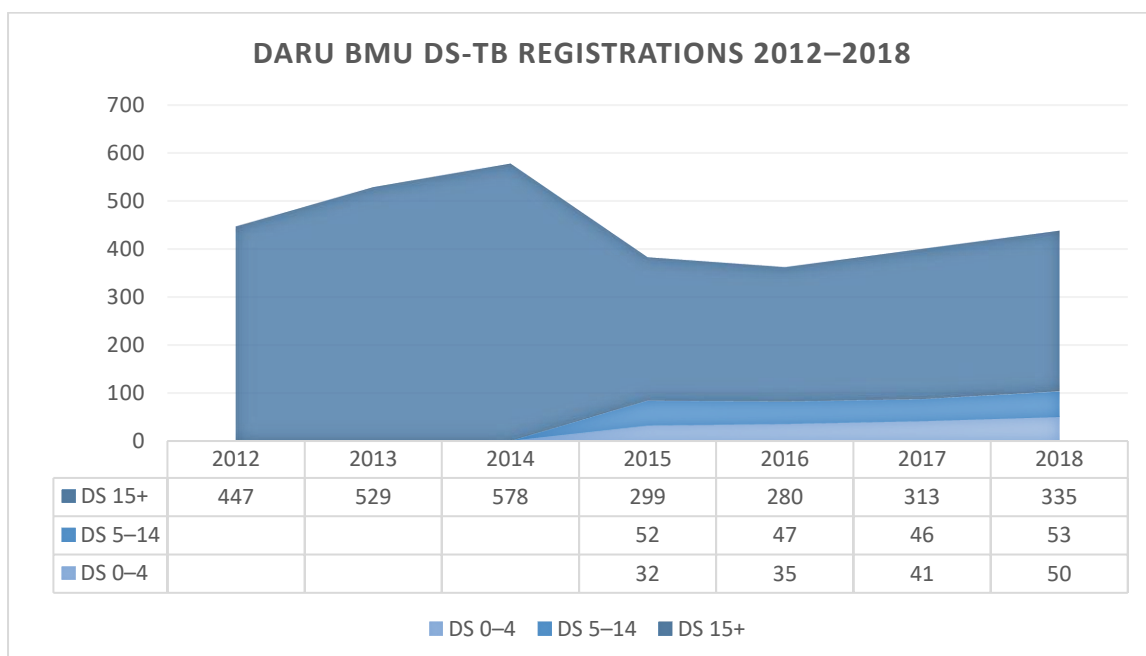
Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

**Figure 7: MDR-TB BMU Registrations 2012-2018**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

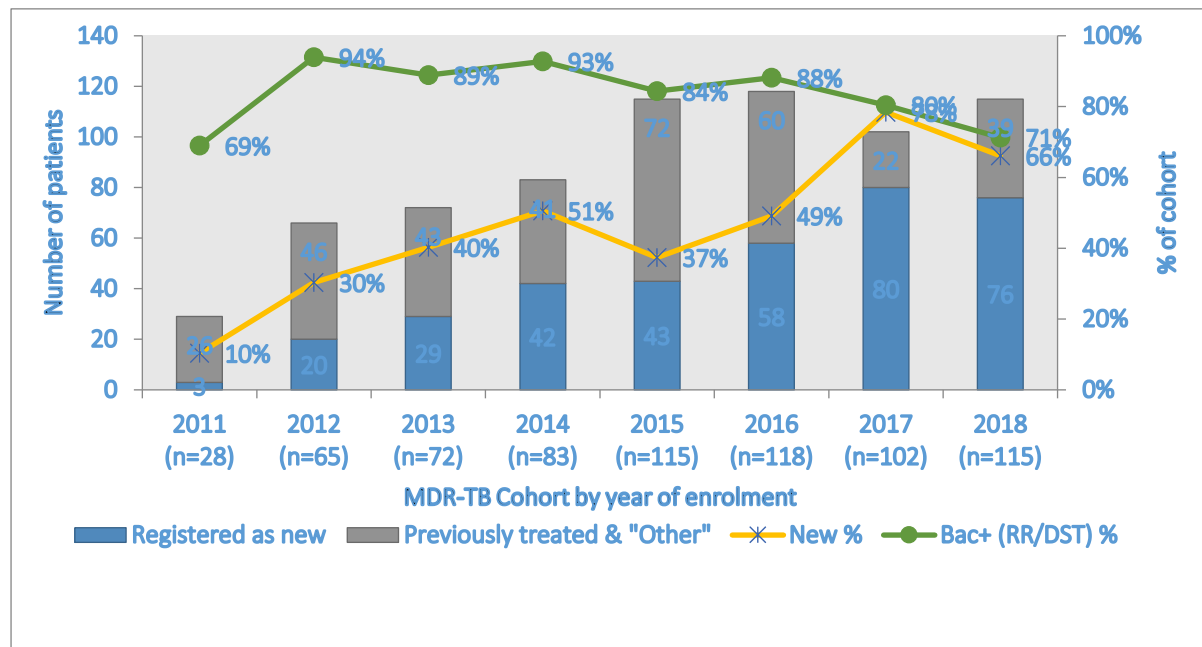
**Figure 8: DS-TB BMU Registrations 2012-2018**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

Figure 9 below demonstrates the more than 75% newly notified DR-TB cases in Daru in 2017 and 2018, i.e. who had no previous history of TB treatment with 80% of them confirmed bacteriologically - a gap of 20% with no confirmation.

**Figure 9: MDR-TB Cohort Bacteriological Confirmation 2011-2018**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

High, newly diagnosed MDR-TB implies community transmission of drug resistant bacilli and the need for stronger efforts for active TB case finding to treat and prevent TB including through preventative TB therapy for active epidemic control. Bacteriological confirmation is not always established in paediatric TB as the majority is non-pulmonary, so sputum samples are not available. While gastric aspirate or node biopsy can also provide diagnosis, many paediatric cases are diagnosed on clinical symptoms and exposure to TB contacts in the household. There is however an apparent increase in paediatric patients with bacteriological confirmation for the 2018 MDR-TB cohort while some of the diagnostic test results (i.e. culture and phenotypic DST results for Q4 patients) were still pending at the time of the review. This may change the proportion of MDR-TB cases with bacteriological confirmation.

### 2.3. DFAT M&E framework and cross-cutting themes overview

Table 4 below summarises the review findings against the DFAT M&E framework and key-crosscutting themes (from the PNG 2016-2020 National Health Plan, *reducing the burden of communicable diseases* and from the 2012 DFAT TB strategy, *an effective public health response*).

**Table 4: Review findings against DFAT M&E framework and key-crosscutting themes.**

| ⇒ Review framework (DFAT M&E)  | Relevance (of response)               | Effectiveness   | Efficiency   | Impact  | Sustainability   | Gender and social inclusion  | Governance, management and partner coordination   |
|--|---------------------------------------|---|--|---|--|--|---|
| ⇓ Key cross cutting themes   |                                       |   |  |   |  |  |   |
| <p><b>Reducing the burden of communicable diseases and an effective public health response</b></p> | <p>WP: Relevant<br/>NCD: Relevant</p> | <p>WP: Effective but not yet sustainable: treatment success of 85% of DS-TB and 87.3% MDR-TB in 2016 cohort – higher than the global average of 50%; LTFU also world class reducing from 27.5% in 2014 to 1.5% in the 2017 DS-TB patient cohort and from 18% to 2.5% for MDR-TB among the 2016 cohort.</p> <p>NCD: Not yet fully effective given recent commencement; estimated LTFU 23%-33%.</p> | <p>WP: Moderately efficient, further efficiencies needed including for GeneXpert testing, a well-functioning X-ray machine at DGH, eliminating duplication at community level.</p> <p>NCD: Improving; inefficiencies are associated with recent commencement, weak referral systems and high numbers of TB patients.</p> | <p>WP: High – stigma reduced, community understanding high, health seeking behaviours improved = more lives saved.</p> <p>NCD: Process impacts good (e.g. Port Moresby General Hospital screening X-rays at 3,200 per month); strong community-based start augurs well for high impact.</p> | <p>WP: Not sustainable without continued support; numbers of new cases are not declining (~500 per annum), re-infections are emerging and rural roll out is only just beginning.</p> <p>NCD: Not sustainable without continued support – full emergency response is in early stages.</p> | <p>WP: Good; deeper analysis needed on gender disaggregated health seeking behaviours.</p> <p>NCD: Good; deeper analysis needed on gender disaggregated health seeking behaviours.</p> | <p>WP: Needs strengthening particularly Core Group and replacing designated PHO TB leadership, position currently vacant.</p> <p>NCD: Governance and management architecture good; complex partner model with some risks without stronger management and coordination mechanisms.</p> |



Table 5 below presents the impact of the crosscutting themes on the DFAT-funded TB response against the DFAT M&E framework and their relative importance in 2019 and beyond to inform future DFAT design thinking in partnership with GOPNG.

**Table 5: Crosscutting themes & impact on DFAT-funded TB response and importance to future response**

| <i>Cross cutting theme</i>               | <i><u>Impact to date</u></i>  | <i><u>Importance to future response</u></i>   |
|--|---|---|
| Phased support                           | WP: Good<br>NCD: Good   | WP: High<br>NCD: High   |
| Supporting PNG leadership                | WP: Good<br>NCD: Good   | WP: High<br>NCD: High   |
| Sustained cross-border initiative        | WP: Good<br>NCD: N/A  | WP: High<br>NCD: N/A  |
| Strengthened health systems and services | WP: Weak<br>NCD: Weak   | WP: High<br>NCD: High   |
| Rural focus                              | WP: Limited, roll out only beginning<br>NCD: N/A in NCD but patients from other provinces important because of amplification risks  | WP: High, strong rollout needed; logistically complex<br>NCD: N/A in NCD; TB treatment in relevant other provinces needs strengthening  |
| Integrated primary health care           | WP: TB-specific only<br>NCD: TB-specific only   | WP: High, opportunity over next few years to use maturing response in Daru to develop strong integrated primary healthcare services e.g. immunisation, nutrition, MCH<br>NCD: High, as above but TB response needs time to mature first |
| Infrastructure                           | WP: Good hospital MDR-TB ward, rest of hospital inadequate<br>NCD: Poor community health centres, main hospital (Pt Moresby General) overcrowded  | WP: High<br>NCD: High   |
| Gender and social inclusion              | WP: Good<br>NCD: Good   | WP: High - deeper analysis of behavioural factors and social determinants of health needed<br>NCD: High - deeper analysis of behavioural factors and social determinants of health needed   |
| Data/information                         | WP: Data capture good; data ownership sensitive and needs formalising; sensitivities about data use high<br>NCD: Data capture strengthening but fragmented; eHealth platform mid-2019                       | WP: High<br>NCD: High   |
| Regular review & independent monitoring  | WP: rGLC 2016 & 2018 only for overall response; this review is first DFAT- initiated independent review<br>NCD: rGLC as above for overall response; this review is first DFAT- initiated independent review | WP: High, additional to rGLC<br>NCD: High, additional to rGLC   |

## 2.4. Assessment and discussion against DFAT M&E framework

### 2.4.1. Relevance

The technical focus of the DFAT investments in Daru NCD is highly relevant. The DFAT investment has strongly contributed to the success of the TB emergency response to date in Daru and progress in NCD and is a credit to all. In 2013 (prior to the emergency response) the situation in Daru was challenging. Thirteen staff at Daru General Hospital (DGH) had TB, some MDR-TB, and some died. Staff was on strike, DGH was operating below par (some consultants said at a Level 2 instead of its designated Level 5), staff recruitment was difficult and there was no streamlined community-based directly observed treatment, short-course (DOTS) or other integrated and effective community responses. An estimate is that >50% of patients were LTFU. DGH occupancy for TB was 100% with waiting lists for MDR- and XDR-TB patients.

In 2012 DFAT funded a new MDR-TB ward and isolation rooms in DGH (cost > AUD5.8m) and in 2014 the emergency TB response in Daru focused on MDR-TB. Consequent transformational change in TB services in Daru has resulted in extraordinary achievements.

There are now strong community-based, patient-centred TB services (including observed treatment, community engagement, education, counselling, outreach, peer-support, referral and monitoring systems), accurate hospital and community data (albeit not yet integrated into government systems), low MDR-TB ward occupancy and good DGH recruitment with some key appointments supported by DFAT-funded incentives. Technical innovations in Daru and NCD include (i) strengthening case finding by supporting TB diagnostics, treatment of MDR-TB, household contact screening and preventative therapy; (ii) best practice, patient-centred, models of care focused on finding cases early, initiating timely and appropriate treatment and preventing new infections including the community-based approach; and (iii) community-based nutrition support (lunch supplied daily for those taking medication, for example).

The logistically complex rollout to the rest of WP has commenced and will require further innovation, strong leadership, strong and synergistic partnerships between all key players and good monitoring.

In NCD, there are early encouraging signs and hopes that the response will be as effective as in Daru over the next 2-3 years. Additional innovative approaches may well be needed to prevent resistance amplification.

The implementing technical partners are critical to the success of the emergency response in WP and NCD. In Daru their technical excellence has been amply demonstrated including their challenging traditional thinking in the early days of the response, significantly contributing to success. In NCD partners of technical excellence have been selected and experience is being gained in the emergency response initiatives, building on lessons learned from Daru and elsewhere adapted to the different context of NCD.

### 2.4.2. Effectiveness

#### Daru, Western Province

The results in Daru, WP since 2014 are strongly effective. As per Figures 3 and 4 above, evidence of effectiveness includes the treatment success rates for DS-TB (85%) and MDR-TB (87.3%) for the 2017 and 2016 cohorts respectively and the remarkable decrease in LTFU to 1.5% in the 2017 DS-TB patient cohort and 2.5% for MDR-TB in the 2016 cohort. These outcomes compare well with the early years of the intervention, other parts of PNG, and global outcomes. Globally LTFU among MDR-TB patient is high (in some middle-income countries it is closer to 50%) due to length of treatment, regimen toxicity and adverse effects, and lack of supportive systems for patients. A reduced DS-TB and MDR-TB LTFU is an important metric. A decrease signals improved treatment success, minimisation of community transmission especially the transmission of resistant strains - partially treated - and

preventing resistance amplification. The LFTU results in Daru demonstrate a strong support mechanism for patients to prevent treatment interruption.

However, the high newly diagnosed MDR-TB in Daru in 2017 and 2018 (see Figure 9) and its implication that there is community transmission of drug resistant bacilli means more effort is needed for active TB case finding and treatment and preventing TB through preventative TB therapy to ensure active epidemic control. As well, while case notification has decreased, the continuing high number of case notifications indicates the ongoing need for sustained effort over the next 7-10 years to reduce the burden of TB.<sup>26</sup>

Whilst important, these figures do not detract from the impressive gains in Daru, which were driven by early detection and adherence to treatment and boosting service delivery first in DGH and then strongly with communities. Community services include providing treatment at the community-based Daru Accelerated Response to TB (DART) sites and outreach services for adults and children.

A consequence of the strengthened community-based services was a reduction in length of stay at DGH (from many months in some instances) and steady and rapid decrease in occupancy from 100% - with a waiting list for admission, including for MDR- and XDR-TB patients at the beginning of the response in 2014/2015 - to 10% during the review in December 2018. This low TB patient bed occupancy at DGH is testament to the success of the response in Daru. However, analysis of projected caseload over the next, say, 5-8 years against DGH TB facilities is needed as part of the WP roll-out. The WP roll out may increase demand initially for the MDR-TB ward at DGH, noting that community treatment should result in no hospitalisation or a short length-of-stay for most patients but that the number of patients diagnosed may increase. When the TB epidemic eases over the next 7-10 years – assuming continued successful effort - there will be less need for the MDR-TB ward beds. Arbitrary decisions at DGH to reduce the number of TB beds as was mooted during the review should be avoided until there is the evidence provided by the analysis.

DGH is leading the introduction of new TB drugs on PNG including Bedaquiline (Bdq) and Delamanid. The number of TB patients enrolled on Bdq-containing regimen in 2018 was 62 nationally exceeding the national target of 59. Fifty-four (54) were initiated at DGH.

The DFAT investment in Daru has included secure drug supplies, a digital X-ray, a GeneXpert machine, a water ambulance including for education and outreach, a new MDR-TB ward at DGH, training of community health providers and staff financial incentives to support recruitment. At the time of the review in December 2018, the digital X-ray and water taxi were non-operational due to lack of spare parts. This points to a perennial problem in the PNG health system of inadequate operational budgets for repairs and a weak culture of, and skills base in, repairs and maintenance. These issues will not be turned around overnight but the review notes that the health system decentralisation may make a significant contribution with the strong support of NDOH and the DFAT-co-funded HSSDP and its comprehensive health system strengthening support.

More broadly, the impressive TB results in Daru were achieved despite ongoing chronic TB causative factors including overcrowded housing, under-nutrition, water shortages, poverty, and a fluctuating population as people from elsewhere in WP come regularly to Daru to collect mining royalties and for other purposes. Patients diagnosed with TB and having to remain in Daru for treatment can lack family support and sufficient food and water

A key lesson learned from Daru is that despite successes the sustainability of the response is fragile. There is no room for complacency and continual effort is needed to maintain a strong and cohesive response.

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<sup>26</sup> Morris et al. 2018. *The Emergency Response to Multi-drug Resistant Tuberculosis in Daru, Western Province, Papua New Guinea 2014-2017 (in press)*. Papua New Guinea.

## NCD

In NCD, strong DFAT support began in 2016/2017 for more powerful NCD-led efforts to respond to the TB emergency and early results are encouraging. NCD is a high risk for amplification of TB because of its fluctuating populations from other provinces and high incidence of TB given it has 25% of all TB cases with an estimated 5% only of the PNG population and that TB case notification rates are nearly 4 times higher than the national average.<sup>27</sup> NCD has similar social determinants of health and well-being complexities to Daru. As well as the fluctuating population in NCD from other provinces, many people live in poverty in overcrowded houses with poor water and sanitation in the informal settlements in particular and many are under- or mal-nourished.

Progress in NCD since 2016-2017 largely compares with progress in Daru in the same early period – although there are geographical and population differences and a more complex partnership model. NCD has a similar community-based DOTS treatment and support model to Daru and training, although supervisors are needed. Distances can also be long for patients and community-based staff to travel, often by foot. Community health centres are in a poor state of repair. DFAT is funding the renovation of three community health centres Basic Medical Units (BMUs) in 2019 to assist.

LTFU remains high at an estimated 23-33% (depending on which service) down from an estimated previous LTFU of > 50% (noting that data is problematic in NCD). This is in contrast to Daru's 1.5% for DS-TB and 2.5% for MDR-TB, while noting that Daru's LTFU was also estimated at 50% when the emergency response began. Further improvements in LTFU and cure rates in NCD can therefore be anticipated as the response strengthens and accelerates during 2019 but a complexity is that NCD's diverse and fluctuating population contributes to the high LTFU as people return to their home province and treatment there is unknown and patient tracing is generally not possible. There is also a critical disconnect between patients from PMGH adult and paediatric outpatients and community-based services for treatment and patient tracing/outreach. There is also some disconnect between the three community-based services with some patients becoming LTFU when they cross internal geographic boundaries within NCD. The review recommends a root cause analysis of the high LTFU in NCD in 2019 to support both strengthening and accelerating the TB response including discharge of PMGH TB outpatients to community-based care, adults and children.

## TB Screening

There are differing technical views among those consulted about the most effective approach to TB screening and disagreement about the approach in Daru. The rGLC 2018 report found that from Feb-May 2018, 875 (33%) households had been reached in Daru and 568 (65%) participated in systematic screening for TB. The review team was given varying reach figures to December 2018, from 55% to 70%. Mandatory screening in 2019 is being discussed at a national policy level to increase the uptake. There may be ethical issues.<sup>28</sup> An alternative could be expansion of a household and community-based screening model, with the important intervention of preventive treatment of latent TB. WV will conduct 'mop up' screening in Q1 2019. A review of the impact and outcomes of the Daru screening is recommended in 2019 with the aim of guiding effective future TB screening in PNG, including in NCD. Mobile screening in NCD is planned for later in 2019 and may include GeneXpert ultra-testing.<sup>29</sup> This is supported by the review as is purposeful systematic screening.<sup>30</sup>

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<sup>27</sup> Population data is weak in PNG and the last census was in 2011.

<sup>28</sup> The principle of the autonomy of the individual is central to medical ethics.

<sup>29</sup> GeneXpert tests diagnose TB and rifampicin resistant (RR) TB in 2 hours; sensitivity is imperfect in smear-negative and HIV-associated TB and Ultra GeneXpert testing is a second-generation test designed to overcome sensitivity limitations and it also gives results in 2 hours; its development was co-funded by GOA. Ultra GeneXpert testing will have special impact for children, HIV/TB co-infected patients and other difficult-to-diagnose groups by enabling rapid TB diagnosis.

<sup>30</sup> GeneXpert tests diagnose TB and rifampicin resistant (RR) TB in 2 hours; sensitivity is imperfect in smear-negative and HIV-associated TB and Ultra GeneXpert testing is a second-generation test designed to overcome sensitivity limitations and

The review team is of the view that a rapidly implemented systematic approach, purposefully targeting decreases in high-risk groups, can strongly support eliminating TB if compounded with preventative TB therapy for infected individuals with no TB symptoms. Key to effective systematic screening is speed to mitigate against new and re-infections. In an effective strategy a high proportion of at-risk people are screened in a relatively short period of time, otherwise new infections are missed.

#### Infection of health workers

In the early days of the TB epidemic, tragically some health workers died. Daru data indicate that 10 health workers have been infected and rGLC 2018 data is that 120 employees were diagnosed at PMGH (among 1600 staff) since 2013. Of the diagnosed employees, 72% were hospital staff, 20% medical students and 8% other. At Gerehu Hospital in NCD around 20 staff have been notified since 2013. The proportion of TB infection that is hospital versus community-acquired is unknown. DGH is well ventilated and strict about staff wearing appropriate protective masks (e.g. N95 protective respirator masks) after a long process to achieve this. At PMGH protective masks seem largely to be worn in the adult TB ward and outpatient clinic. Nurses at PMGH expressed concern about the lack of protective masks in the paediatric TB ward although the review was assured they were available and understands the different aspect of paediatric TB risk of TB cross-infection versus pulmonary TB adults for example. At both DGH and PMGH some staff were concerned at the lack of focus on staff and patient protection along the patient journey, e.g. in theatre. The rGLC (2018) recommended the urgent development of a national policy and guidelines on TB infection control including the training of health care workers, community and patients. The review team agrees and adds that this should include multidisciplinary training for hospital staff through the patient journey, not just TB staff.

#### Paediatric protocols

The DFAT-funded Child TB Project at PMGH has seen 1500 children over the last 2 years during the trial phase of a paediatric pharmaceutical. The pharmaceutical is now being absorbed into PNG health funding streams – an excellent outcome and return on investment to children in PNG from DFAT funding. National paediatric protocols and further training for community-based services is the next step for completing added value and DFAT funding for this is suggested.

#### TB contributory causative factors

Contributory causative factors of TB in both WP and NCD are not being effectively addressed including poverty, increased populations with limited and overcrowded housing, under-nutrition and poor services such as water and sanitation. The review fully acknowledges that these factors have been beyond the scope of the DFAT TB investments but believes that a long term and sustained approach is needed underpinned by bold thinking. This is addressed further under sustainability in section 2.6 below.

#### 2.4.3. Efficiency

There are some good efficiencies in the DFAT-supported PNG government response to TB, and more to be made.

#### TB Delivery Model

Efficiencies in Daru include the community-based DOTS treatment model across five (5) sites of around 200-300 patients overall (numbers vary), reducing the burden on hospitals through decreased lengths of stay or no hospitalisation, increasing the potential productivity of patients and their families and improving adherence. Given the reduction in demand for hospital beds now balanced against the

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it also gives results in 2 hours; its development was co-funded by GOA. Ultra will have special impact for children, HIV/TB co-infected patients and other difficult-to-diagnose groups by enabling rapid TB diagnosis.

TB roll-out to the rest of WP, an estimate of future MDR-TB ward occupancy needs at DGH is recommended.

A stronger health system strengthening approach would assist not only the TB response but also sustainability. As well as engaging with HSSDP, a way to iteratively commence this is to incorporate the patient journey into all thinking for future TB initiatives, thereby broadening the approach towards health system strengthening while not losing the necessary vertical TB care focus. An example is building integrated primary health care services on the platform of the excellent TB community-based services as the emergency response matures.

HSSDP initiatives are many and include governance and management development, information systems strengthening (as is planned for NCD in 2019), drug supply strengthening for example through mSupply (as was done for the DGH TB drug store and which may possibly over time move to an integrated pharmacy approach), streamlining health funding, selected health infrastructure upgrading (while DGH is outside the guidelines a special case could be presented given its parlous state and the TB emergency response), and a myriad of other health system strengthening initiatives. As a 'next step' from 2019 key PNG national and local TB players could participate in the HSSDP leadership and management development programs as a proactive strategy for continually strengthening leadership and management of the TB response.

#### TB Guidelines and Protocols

Adherence to TB guidelines and protocols for management of TB is a core, essential efficiency so as not to contribute to amplification of resistance or worse outcomes. Some consulted highlighted that given changing WHO guidelines some deviations if in accordance with latest WHO recommendations would actually improve outcomes and reduce resistance development. Notwithstanding this view, adherence to guidelines and protocols is highly desirable and requires a strong approach that encompasses continuing professional development and quality assurance mechanisms to monitor adherence. GOPNG protocols reflect evidence-based current practice, in line with global WHO guidance and rGLC advice and are updated as new WHO protocols are released. There were major changes in 2018 and more are anticipated in 2019. Strong coordination of and support for national and provincial uptake of new guidelines is important. Also needed is training for multidisciplinary hospital staff along the patient journey, discussed earlier and below, not only those working in TB wards or clinics, in both WP and NCD.

Training needs to be continually reinforced and upgraded including for new hospital staff and senior leaders, as well as community-based health care workers and treatment supporters. Extensive training will be required in 2019 when the WHO-recommended new MDR-TB guidelines and use of new TB drugs become part of PNG national guidelines and should be included in the 2019 work plans of implementing partners.<sup>31</sup> Planning for the new TB drug guidelines should include that excessive supplies of old TB drugs in NCD and WP do not become a barrier to their uptake.

#### Infection control

The 2018 rGLC found there are practical infection control measures in place. The review team concurs, and particularly notes the major effort at DGH, but notes there is ongoing need for vigilance. An assessment of TB infection control at PMGH is suggested in Q1 2019 for continuous improvement and to contribute to establishing standards for the recommended national protocols. Multidisciplinary education along the patient journey has been earlier proposed. A patient's journey might include a theatre procedure whether related to their TB or a co-morbidity, or a trip to X-ray, or pathology, or when first presenting at a hospital or a community-based centre. A focus on the patient journey would map out where multidisciplinary TB education and infection control measures should be implemented

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<sup>31</sup> The new WHO recommendation is designed to prevent adverse events due to injectables and strengthen the existing longer-use drug regimen.

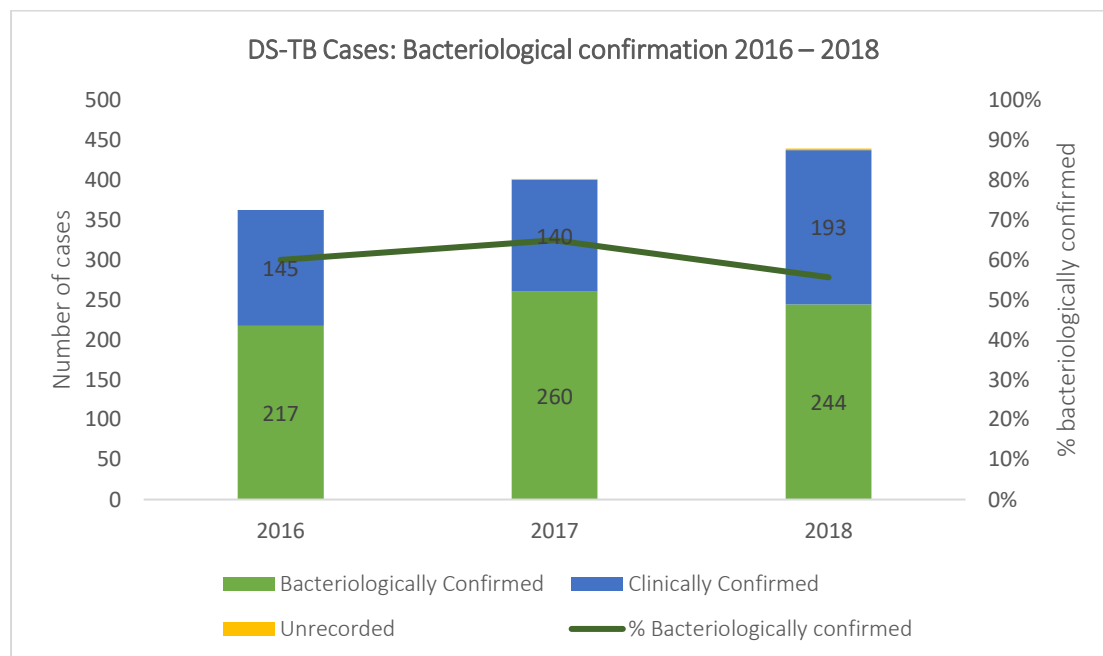
to provide the best possible care to the TB patient and to protect health care workers and other patients from TB infection and reduce anxiety.

### TB Diagnosis

The risk of cross- infection is exacerbated by inefficiencies in generating GeneXpert test results which can be done in two hours and should be available then to the treating health provider. The opportunity costs of current delays are unacceptably high. The GeneXpert test is a molecular test for TB which diagnoses TB by detecting the presence of TB bacteria, as well as testing for resistance to the drug Rifampicin.

Figure 10 (below) shows the TB enrolment in Daru by bacteriological confirmation 2016-2018. For DS-TB in 2018 in Daru, nearly 50% of all notified patients were not confirmed bacteriologically. This might reflect the inability of the DGH laboratory to absorb the increased number of TB cases that were identified during this period, which were therefore diagnosed by clinical evidence rather than bacteriological results. Conversely, it may also reflect a low level of laboratory tests requested or performed by treating clinics. The review recommends an in-depth review to determine the root cause for low bacteriological confirmation among DS-TB patients so that treatment and quality improvement intervention can be designed to address challenges hindering testing. Data on presumptive cases and diagnoses are only available from paper registers and would need to be tallied. Hence, we have presented data on registrations as a surrogate – noting that pre-treatment loss to care is small for the Daru cohort.

**Figure 10: DS-TB Cases Bacteriological Confirmation 2016 – 2018 Daru**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

There is a two-day waiting time for GeneXpert result at DGH. This seems efficient in contrast to the three-week waiting time at PMGH (see below) but is not. It causes multiple downstream issues for patients and staff for infection control and generates infrastructure requests that are probably unnecessary e.g. for isolation wards and rooms and 24-hour staffing of the cough clinic. If the GeneXpert test results were returned in the same working day at DGH, this would impact (i) the infrastructure requests, and (ii) staff and other patients' infection fears. Coughing patients currently sleep overnight in outpatients waiting for their GeneXpert tests (sometimes for two nights) or they are admitted to the one general ward, coughing, with a co-morbidity but no diagnosis for the cough, resulting in the same stressful and possible amplification outcomes.

In economic terms, a 2-day delay in receiving GeneXpert results leads to an opportunity cost to DGH for these bed days of **AUD258,713** per year and an additional **25** infections while patients are waiting for results. In Daru approximately 26% of these are MDR-TB with the remaining 74% DS-TB meaning an associated treatment cost of **AUD49,784** (Annex 8, *Return on Investment GeneXpert machines*). The situation is simple to rectify internally at no cost and should be actioned immediately with all test results notified to the treating doctor in the same working day.

At PMGH there is a three-week delay in PMGH for GeneXpert test results. This is due to insufficient GeneXpert machines. PMGH has the largest cohort of suspected TB patients in PNG, around 6,000 annually, but has one small capacity GeneXpert machine that can test only four (4) samples at a time. The daily utilisation of this GeneXpert machine is 115%. Assuming 10% of the patients tested at PMGH are inpatients at a cost per patient per day of **AUS1492**, a two-week delay in receiving GeneXpert test results is an opportunity cost to the hospital for these bed days of **AUD12.5m** each year. In addition, up to **170** additional infections are forecast while test results are delayed with an associated undiscounted treatment cost of **AUD138,550**. Two additional GeneXpert machines plus cartridges are urgently required to reduce testing time to <24 hours, within one working day, at a cost of **AUD118,736**. The preliminary return on investment for each dollar spent on new testing machines is high at **AUD107** (Annex 8, *Return on Investment GeneXpert machines*).

At Six Mile Clinic in NCD there is a large backlog of samples for GeneXpert testing, as there is elsewhere in NCD community-based TB services. The review understands that some GeneXpert machines have been purchased for NCD community TB services but not yet distributed. These should be made available immediately and appropriate training provided.

Line Probe Assay (LPA) is a laboratory test to identify TB and simultaneously detect mutations associated with drug resistance. LPA testing is done in Queensland necessitating a longer turn-around time than if done in PNG, sometimes greater than 30 days – although the Central Public Health Laboratory (CPHL) advised the review this has been reduced by 50%. The rGLC 2016 recommended doing LPA in PNG because of lengthy turn-around time and volume. There has been a two-year delay in moving testing from Queensland to PNG because of different views including about which testing machine was to be purchased, manual or automatic. GOPNG has now determined it is to be automatic. The review team recommends the timeline to start LPA tests in PNG at the CPHL should be accelerated to Q1 2019, with a saving of **AUD69,710** per annum even though the automatic machine is more expensive (Annex 9, *Return on Investment LPA Automatic Machine In PNG*). Second line probe assay is critical for initiating MDR-TB patients on appropriate treatment regimen including the initiation on short-term regimen or new TB drugs.

### Outreach

In Daru, treatment supporters and contact tracing teams visit the same households and there may be efficiency gains e.g. for health education, while noting their different roles and competencies. In NCD, the high LTFU needs urgent attention to improve treatment outcomes and minimise community transmission including for the large adult and paediatric outpatient clinics at PMGH. PMGH not duplicating current community-based services has been discussed. Instead, the review recommends that referral mechanisms from PMGH to community-based care including outreach and patient tracing are urgently needed between PMGH and the three NCD community partners to assist in decreasing the LTFU. It would be useful to explore the current paediatric Self-Administered Treatment (SAT) approach versus paediatric DOTS for its efficacy in the PNG context as this transition for PMGH outpatients to community-based care happens. SAT is less labour intensive, and an economic efficiency and effectiveness analysis would be useful to support thinking. Another approach is to decide on using SAT or DOTs based on individual patients' circumstances, working out differentiated models of care to fit patient needs.



### Laboratory Support

A strong laboratory system is fundamental to a TB control response. DFAT funds a CPHL advisor to support capacity building and quality. There is a new PNG laboratory strategic plan for 2018-2020 that will be good input to the design thinking for DFAT from 2020 and beyond. As with all DFAT TB investments in PNG from 2020, in laboratory support should be integrated into the overall DFAT TB investment design for 2020-2025.

### Data and eHealth

In Daru, Burnet has supported improved accuracy of reporting and monitoring, a clear efficiency gain, although conversely inefficiencies have arisen as details are worked through on data ownership, access and use (see section 2.6 below). In NCD, there are known inefficient data issues and eHealth solutions are being rolled out and tested, described as a 'gamechanger' by a senior TB expert in PNG that will overcome current data disconnects. TB staff consulted in NCD remain wary of the efficacy of eHealth until proven and data is being recorded in several places in parallel as a risk management strategy, increasing inefficiency. The review team well understands the desire to mitigate risk while the eHealth solution is tested and understands this will be completed during 2019.

### Infrastructure

In Daru, DGH infrastructure is poor and needs improving. Infection control is difficult with such crumbling buildings - other than the well-designed DFAT-funded MDR-TB ward which stands in stark contrast to the rest of the hospital. There is only one non-TB ward which children, adults and the elderly share - sometimes with not-yet-diagnosed coughing TB patients given the delays in receiving test results. The laboratory is small. X-ray is cramped as is pharmacy and the operating theatre. The emergency department is small and difficult to provide emergency care in including for TB patients. Floor boards are rotting. While an expert building survey is needed the review team's experience suggests the buildings are beyond ad hoc maintenance.

It would be useful to assess possibilities for DGH hospital improvements, including the option of rebuilding, e.g. under HSSDP, other DFAT-funded initiatives, or other development partners, or the private sector. While the review understands HSSDP infrastructure decisions have already been made and are not focused at provincial hospital level, there may be a special case to be argued given the TB emergency response, the impending rollout of the response to the rest of WP and that WP Provincial Health Authority (PHA) status is said to be imminent, one criterion for HSSDP infrastructure support. The PNG Sustainable Development Program may be another avenue.

In NCD, DFAT is supporting the building of three new community health centres, which all consulted say will make a major difference to staff motivation, client health-seeking behaviours and hopefully therefore LFTU and patient outcomes. PMGH is a large hospital with reasonably good facilities but is crowded, including the TB outpatient clinics. This TB outpatient crowding should be alleviated with better connectedness to the TB community services.

#### 2.4.4. Impact

The overall impact of the GOA investment is lives saved and improvement in the general health of the population, particularly the most vulnerable. There is a multiplier effect socially and economically. In particular as women receive treatment and recover from TB, they are able to provide better care and support for their families including their husbands and male partners. People are well again and can return to their livelihood to earn income. DFAT's investment in TB has also provided direct income earning opportunities through the direct employment of local people.

Data is available from Daru to economically assess the impact of the response but is insufficient yet from WP overall or from NCD. The total DFAT investment in 2014-2018 in Daru was **AUD27.1m** with an estimated preliminary return on each dollar of investment of **AUD2.30** for each dollar spent. The investment in Daru has cost an estimated **AUD3,089** per life year saved, based on 531 MDR-TB and 2162 DS-TB cases treated in Daru between 2014 and 2018. The excellent treatment success rates in

Daru - up to 87.3% for MDR-TB and 85% for DS-TB in 2018 – resulted in saved infections. It is estimated that from 2014-2018 in Daru 1,037 MDR-TB and 4,339 DS-TB infections have been saved, resulting in saved pharmaceutical costs of **AUD8.2m**, lowered mortality (**255 deaths averted**) and increased productivity (**1,760 additional years of productivity** over the life course). (See Annex 7, *Return on Investment DFAT funding in Daru*). Similar economic analyses are recommended for WP and NCD annually for trend analysis to guide thinking and strategies.).

#### 2.4.5. Sustainability

The review agrees with the rGLC 2018 recommendation that sustainability is not possible – the TB epidemic will not end - without continued investment, possibly over the next 7 to 10 years or longer and believes DFAT has a continuing major role to play, and a responsibility given its investment to date. Key issues include that there are a continuing high number of new cases in Daru and NCD; the DFAT-supported NCD response is in an early phase and Daru is only 2-3 years ahead; the logistically complex roll out to rural areas in WP is only just beginning; and some experts consulted noted that MDR-TB and DS-TB may be more wide-spread in other provinces than realised. In addition, the direct cost of treating TB is expensive - albeit cost-effective - and the treatment of MDR-TB and XDR-TB even more so and PNG health financing is low. MDR-TB medication costs in PNG are approximately AUD7,000 and for XDR-TB AUD14,500 per person per year, compared with an average estimated health care spend of AUD150 per person per year. The health system weaknesses are many and the social determinants of health and well-being poor. The current effective community-based response is heavily reliant on volunteers and casual workers, men and women. This approach may perhaps not be sustainable over time if the emergency is perceived to diminish - even if the data indicates otherwise.

Implementing partners in WP are focusing on sustainability and ending the epidemic; in NCD early efforts have this end point in mind. In WP, WV is supporting community TB awareness raising including through the Multi Sectoral Alliance of Daru for TB (MAD), which brings together representatives from community, church, schools, business, NGOs and public offices as well as other capacity development initiatives. Burnet is also active in capacity building including for technical excellence, data and analysis, and PNG research capability development. There are two important locally-led research papers in press, supported by Burnet, and another on the TB patient journey in PNG. There may well be others. They should be strongly informative to the TB response generally and NCD and WP specifically, and thus the DFAT TB investment design from 2020.

Businesses not only have community social obligations but also require a healthy workforce for their continuing and future commercial success. The high TB prevalence in PNG is a grave threat to PNG achieving its economic potential. The review suggests DFAT consider engagement with the commercial sector and other development partners to support GOPNG address contributory causes of TB (e.g. health infrastructure, affordable housing, water and sanitation). There may also be opportunity for DFAT to embed health improvements for local communities in its various economic development programs and to discuss a similar approach with development partners. The magnitude of the challenge is not underestimated but a purposeful long-term approach is needed, as is bold thinking.

Engaging with senior business stakeholders would build on the DFAT investment in Business 4 Health (B4H) in NCD (approximately AUD350,000) seed funding in 2016 plus ongoing funding). B4H has a user-pays TB training module and an annual subscription system but is not self-sufficient. B4H has trained 172 workers in *Workplace Response to TB* from 90 different companies as well as communicating with the public and partners through various communication strategies. While data remains a challenge, B4H has recorded 72 case findings as a result of its training. This will be strengthened in 2019 as WV implements its *TB in the Workplace Program*, It would be efficient and assist overall effectiveness if the commercial sector's engagement, large or small, was an integral part of the proposed future DFAT TB investment design from 2020.

Compounding sustainability issues in WP and ending the TB epidemic is staff recruitment: housing availability is poor and limited, there are few schools, a high cost of living, and limited nutritious food such as vegetables and water are scarce. Current financial incentives to recruit doctors and others in Daru, supported by DFAT, have been successful and without them arguably the TB response could not have been successful. The incentives are probably not affordable in the long term for GOPNG.

Finally, any vertical disease intervention has sustainability limitations particularly when the health system is weak, as it is in PNG. This adds weight to the proposition of the need for a purposeful focus on health system strengthening and the social determinants of health and well-being and sustainable development goals for social and economic development.

#### 2.4.6. Gender and social inclusion<sup>32</sup>

DFAT's investment in gender and social inclusion in the TB response is relevant and effective. Gender and social inclusion efforts are critically important given the PNG context of serious gender inequality and gender-based violence that negatively impact the health of women and girls, their need for health services and their health seeking behaviours. The poor underlying social determinants of health and wellbeing in PNG such as low rates of education and literacy, and poverty also limit equity of access to health services and improved health for those most vulnerable (despite the 2014 GOPNG initiative of free primary health care). Other factors include no or limited access to transportation to health care facilities because of, for example, remoteness and costs.

##### Gender

The review team notes the considerable attention given to gender and social inclusion in the TB response in PNG, and that there have been continual improvement efforts. These include sex-disaggregated data for reporting, psychosocial support for patients (men and women) and their families, the linking of the TB community programs with a referral pathway for individuals experiencing gender based violence, working to reduce stigma associated with TB and including adolescents through the uptake and access to contraception (See Annex 6, *Gender and Social Inclusion*).

The average national ratio of notified male to female TB cases in PNG from 2010 – 2015 was 1.07 (range 1.01 - 1.15) and remains stable.<sup>33</sup> Data suggests a similar ratio in Daru. rGLC 2018 Daru figures were 52.5% male to 47.5% female distribution of active TB patients and 56% of the females had MDR-TB and 49% DS-TB. Child Fund 2018 data in NCD data shows an equal distribution of TB infection between males and females, but a difference in high TB burden suburbs where there are more TB-infected adult females (47%) than males (33%) and children under 15 years old (20%). This possibly relates to poorer nutritional status of women aligned with low socio-economic characteristics while noting data accuracy is a recognised issue in NCD (Annex 6).

The observed male to female ratios of TB patients in PNG generally and Daru and NCD specifically is significantly lower than the global average in low-income countries of 2 male cases for every 1 female TB cases.<sup>34</sup> The reasons for this are uncertain but may include general community transmission versus gender congregate settings such as prisons and mines. Many consulted in NCD and WP spoke of their efforts to reach out to women through education and engagement with TB treatment. Part of this is the DOTS model making it easier for women, and those most vulnerable, to access treatment with the back-up of treatment supporters who go to them if they don't present for treatment – other than at

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<sup>32</sup> For more detail see Annex 6 *Gender and Social Inclusion*.

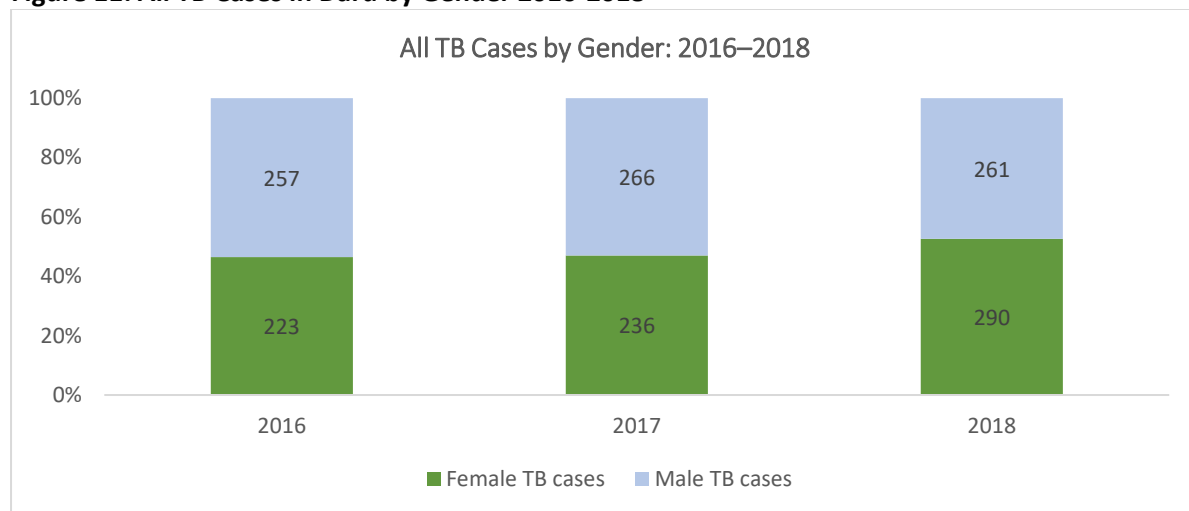
<sup>33</sup> Aia P, Kal M, Lavu E, John LN, Johnson K, Coulter C, et al. 2016. *The Burden of Drug-Resistant Tuberculosis in Papua New Guinea: Results of a Large Population-Based Survey*. PLoS ONE 11(3): e0149806. doi:10.1371/journal.pone.0149806

<sup>34</sup> Horton KC, MacPherson P, Houben RMGJ, White RG, Corbett EL (2016) Sex Differences in Tuberculosis Burden and Notifications in Low- and Middle-Income Countries: A Systematic Review and Meta-analysis. PLoS Med 13(9): e1002119. doi:10.1371/journal.pmed.1002119

PMGH TB outpatient clinics, adult and paediatric, where there is no outreach.. A behavioural pilot study has been conducted in Daru (and is in analysis), funded through DFAT’s Centre for Health Security, and a study is planned in Daru and NCD, to further understand TB health seeking behaviours of men and women. It would be useful to understand whether the demographic profile of those diagnosed with TB matches the profile of those where laboratory tests confirm infection with TB.

Figure 11 below shows that for TB case notification of all forms in Daru, from 2016-2017, more males than females were registered. In 2018 there was a slight increase in the number of females registered possibly as a result of intensified community case finding approaches. Segregation of data by age group and gender is advised in the future.

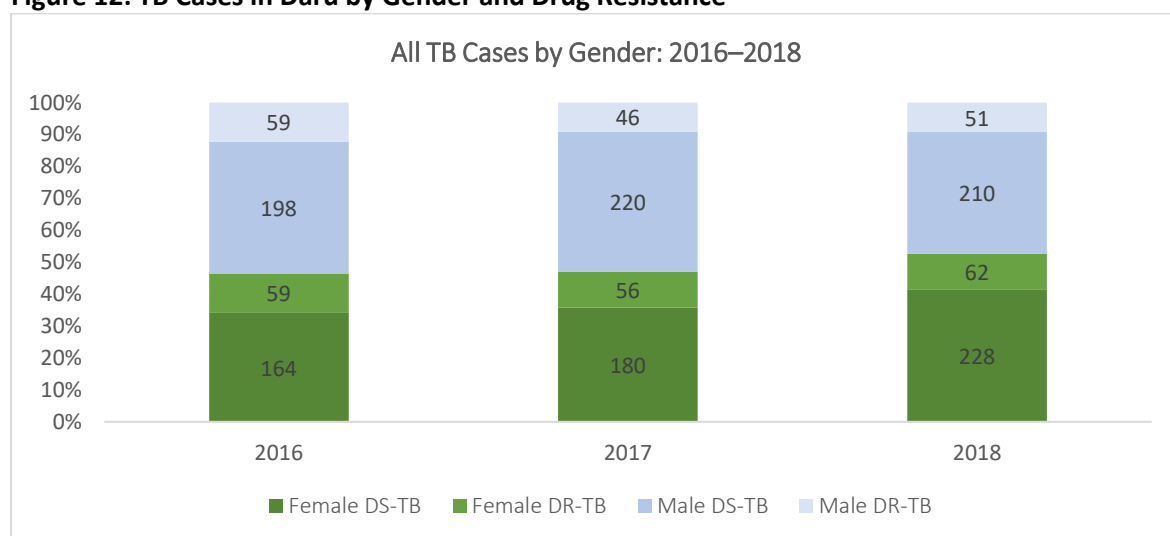
**Figure 11: All TB Cases in Daru by Gender 2016-2018**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

The review team also analysed the registered TB in Daru cases by gender and by drug resistance for the period 2015-2018 (Figure 12 below). There was no significant difference in frequency of resistance by gender.

**Figure 12: TB Cases in Daru by Gender and Drug Resistance**



Source: PNG National TB Program (NTP) using the routine reporting system as well as other programmatic data and reports.

### Vulnerable populations

In Daru, community advocacy and awareness has expanded since 2014 and screening, treatment and care includes women and girls, children, in and out-of-school youth, prisoners and people living with disability. Initiatives in NCD are similarly best practice, just commencing later. Where a TB patient cannot access the community-based treatment centres (e.g. because of poverty or disability or physical weakness) then treatment supporters take the medications to the patient in their home in both Daru and NCD. This is a problematic issue for those attending PMGH TB outpatient clinics.

Informal settlements in PNG are high-risk areas for TB. A large proportion of women, children, and young people between 12 and 25 years old who have received and are receiving MDR-DR and DS-TB treatment in both NCD and Daru live in informal settlements where disadvantage is highest. These people have lower socio-economic status and poverty and local advice in Daru is that crime, gender-related violence and poor nutrition are more commonly seen. Severe multi-generational household overcrowding is also reported with one contact tracing in Daru revealing 59 people in one household; 20-25 people per household is not unusual. This contributes to a household-based TB transmission cycle through different generations.

In its 2017 PNG epidemiological study WHO concluded that although there is a need to maintain focus on TB among children and young adults in PNG, the elderly may be difficult to diagnose due to their asymptomatic clinical appearance and should be closely monitored. Effective outreach and screening are important to address this.

### Partner efforts

All DFAT-funded partners in Daru and in NCD either have or are developing gender, child protection and social inclusion policies and implementation plans. There is a reported increase in female participation in community TB interventions in Daru and almost equal numbers of female and male treatment support staff, some of whom are former patients. In 2017, the Burnet Institute supported WP to (i) integrate cross-cutting issues of gender, disability, child protection and equity into its TB prevention approach, (ii) analyse all programmatic data by sex and age and (iii) develop protocols for socio-behavioural research including significant gender-related components, targeted at gaining a deeper understanding of how best to address gender-related barriers to effective hospital and community-based treatment. For (i) and (ii) in NCD the new eHealth data platform is being rolled out. The behavioural study planned for 2019 will assist greater understanding of TB health seeking behaviours of men and women and guide future strategies. The study findings should be a key input to future design thinking for DFAT TB investment from 2020.

#### 2.4.7. National

The leadership, structure and processes of the National Department of Health for the emergency TB response are strong and effective. There was an initial *TB Emergency Response (ER) Task Force* established in 2014 co-chaired by the National Department of Health (NDOH) and the World Health Organisation (WHO), which was restructured to the *ER Steering Committee* with a higher-level focus (strategic direction, protocols and standards, and coordination and monitoring against high-level TB indicators) and which continues to be co-chaired. This appears to be an effective model. A project management unit (PMU) for the new WB loan co-financed by DFAT was established during the review, located in the NDOH. An experienced, expert TB leader was appointed as its head, augmenting the national TB response capacity.

#### 2.4.8. Western Province

The outstanding successes in WP are due to the efforts of many including the strong national and local TB leadership and management and the competent and committed technical partners, the Burnet Institute and World Vision, and the efficient support of HHISP. Sorely needed is an appointment to the vacant WP TB coordinator position either a PHO medical TB leader or a senior officer, as happened previously with success. If this does not happen then DFAT may need to consider

appointing a coordinating leader from the implementing technical partners or HHISP to assist their local coordination and communication.

There are numerous examples of DFAT-funded partners and local partners collaborating on a daily basis to get the job done. There are also examples of issues where designated local TB leadership would have assisted operational and technical issues between the partners. Partners reporting separately to DFAT is not always the best approach for synergy and complementarity - and can require DFAT to have more of an operational management approach rather than the more desirable role of higher-level policy dialogue, strategy and monitoring.

As the response rolls out to the rest of WP, the role of the Core Group will be even more important and some strengthening of its strategic focus will be needed, particularly given the absence of a designated TB leader at provincial level. At the least the Core Group should meet monthly at a time when all members can attend, take a strategic and continuous improvement approach to all its discussions based on routinely and strongly using data and analysis (e.g. the impact of training in rural South Fly to guide further strategy development). A broader meeting quarterly is also suggested where data and information, progress and issues are presented to a wider audience including NDOH and DFAT representatives, and other key stakeholders as agreed.

To address the need for synergy and interdependency between all, a workshop was held in August 2018 attended by all WP and national key players, and an integrated workplan of WP partners resulted. This should continue in 2019 and within the proposed programmatic DFAT TB investment design from 2010 incorporating an integrated M&E, to ensure a powerful, technically cohesive approach in WP and NCD and elsewhere if there is evidence-based need and DFAT budget sufficiency.

The role of HHISP in WP in contracting staff is not understood by all which has implications for the management of staff contracted through HHISP. For example, some consulted in Daru referred to 'HHISP staff' when HHISP has no TB-response staff per se in DGH or in the community, only a senior management advisor at provincial level. Instead HHISP recruits and contracts on behalf of NDOH or NCD or PMGH or WP or DGH etc. Funding for the positions contacted through HHISP is through the NDOH TB Emergency Response. This lack of understanding has important implications for the management of people in the positions contracted through HHISP: as they are not staff of HHISP they need to be managed well locally.

The number of personnel supported by DFAT-funding has varied over the years but just prior to the review there were 23 locally engaged staff, 4 international advisers – not all in Daru - and incentives paid to some GOPNG staff as an essential recruitment strategy in Daru. Payment of incentives as a recruitment strategy is probably not sustainable in the longer term assuming GOPNG assumes full funding after the next decade of proposed support.

The 2016 WP Partnership Agreement on communication and confidentiality has been effectively implemented. NDOH/DFAT could consider it's updating as one of the underpinning documents for DFAT support in 2020 and beyond in WP, and adaptation as appropriate for NCD.

Not all have understood the transition from the critical direct implementation by Burnet in the initial emergency response to capacity building, data collection and analysis, and research, with some sensitivities around data potentially impacting on monitoring and research (discussed further at section 2.6 below).

#### 2.4.9. National Capital District

As the NCD response is relatively new there is both progress and much to be done, given the high TB burden and high LTFU. The key elements for good governance, management and partner coordination of the emergency TB response in NCD are in place. There is NCD health service leadership and a designated TB response leader. The NCD TB leadership has regular meetings with the DFAT-funded implementing partners and there is a keen collective desire to continually strengthen the TB response.

The partner coordination in NCD has complexities, however, and to be added to these arrangements is the new World Bank loan given its NCD focus.

Complexities include that each of the three NCD implementing partners manages the community response separately in its own geographic area, based on the three NCD administrative areas and MSF is at the Gerehu Hospital. As the NCD agreement with MSF was concluded late in the review, we are unable to comment on the MSF/Gerehu Hospital/community care nexus. At least one implementing partner sub-contracts some services to another organisation and already there are some issues, and there are the patient journey disconnects referred to earlier (from PMGH to community-based outpatient care and between the implementing partner services).

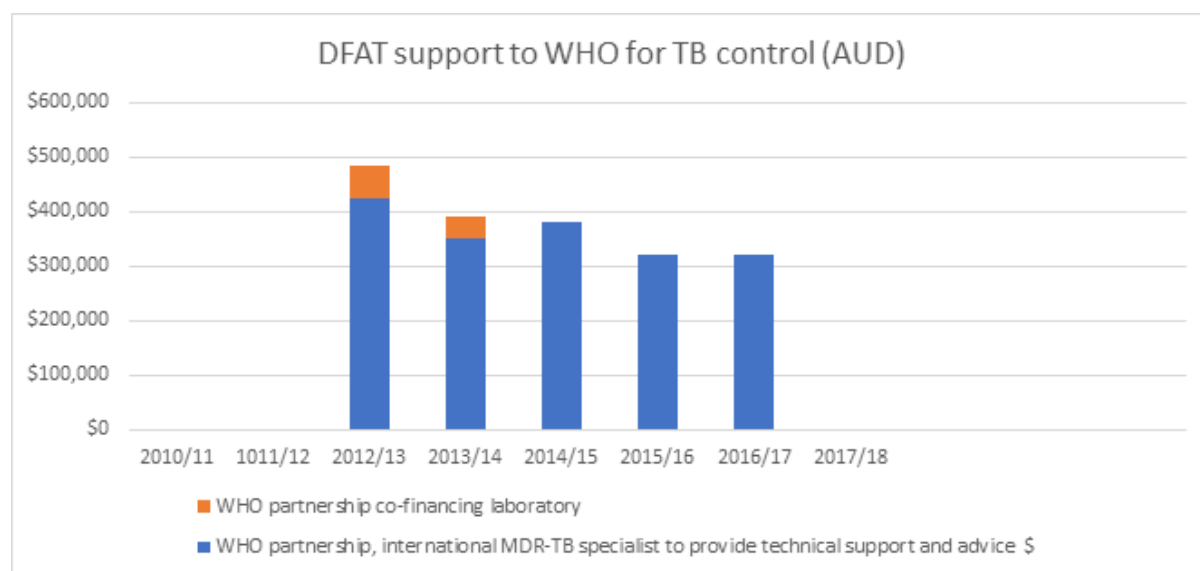
#### 2.4.10. Partner Coordination

A lesson learned from Daru is that misunderstandings of roles and responsibilities and technical approaches can arise between partners and that good processes are needed to mitigate these. The review team suggests that GOPNG/WP/NCD consider assessing current arrangements and augment where necessary as discussed earlier and that DFAT support a continual improvement approach. An overarching programmatic design for future DFAT TB investment with an integrated M&E framework from 2020 has been previously discussed and joint planning of implementing partners. An independent review of DFAT-supported initiatives each two years should be integral to the investment design. Also suggested is annual technical exchange workshops (involving other provinces as relevant). Strong local partner coordination will also assist DFAT's higher-level role of policy dialogue, strategy and monitoring through lessening its involvement in operational issues, a current opportunity cost.

WHO is a key partner and its technical advice has been, and continues to be, highly relevant and is a valuable investment by DFAT. DFAT has invested AUD2,347,600 in WHO for TB in PNG since 2012 (in addition to its general and other funding of WHO) with two objectives: (i) build capacity of the National Tuberculosis Control Programme (NTP) for programmatic management of TB and for implementation of the National Strategic Plan 2015-2020 and (ii) address the challenge of MDR-TB in hot-spot areas. Both have been diligently focused upon by WHO. Importantly, the DFAT investment enabled WHO to recruit an MDR-TB adviser for the first time. 91% of the DFAT investment has supported WHO staff positions and the technical assistance, policy and normative advice and training they provide. The remaining 9% supported building laboratory capacity.

WHO achievements that can be attributed to the DFAT investment include WHO (i) co-chairing with the National Department of Health the national Emergency Response Team; (ii) providing technical guidance to the National TB Programme (NTP) including an expanded focus from 30 to 257 Basic Management Units (BMUs); (iii) supporting the development of the national TB management protocol and standard operating procedures (SOP) for the programmatic management of drug resistant TB (PMDT) across PNG; (iv) pharmacovigilance system development and active drug safety monitoring; (v) building capacity and training staff in the Central Public Health Laboratory; (vi) supporting the development of TB provincial plans in MDR-TB hotspot areas (NCD and Gulf Province); (viii) conducting epidemiological reviews; and (viii) facilitating the rGLC visits.

**Figure 13: DFAT TB Investment in the World Health Organisation for TB control in PNG 2012-2018**



Source: Figures provided by DFAT December 2018.

The USD15 million World Bank Loan for the emergency TB response in PNG has been discussed earlier, including that it will be strengthened by an additional Australian co-financing up to USD6 million (or approximately AUD8 million) allocated against an annual work plan agreed by NDOH and the WB PMU in Port Moresby. The AUD8m loan co-funding is paid in tranches into the WB Multi-Donor Trust Fund. The DFAT parallel funding of AUD12m, and any other DFAT TB-related funding outside the WB loan will be managed by DFAT separately to the World Bank loan. All signs during the review suggest ongoing effective communication and coordination between the National Department of Health, the World Bank and DFAT.

## 2.5. Data and Research

### 2.5.1. Data Systems and Use

The West African Ebola virus epidemic in 2014 highlighted the importance of routine surveillance systems that are designed to scale up quickly during epidemics, linked with laboratories and data being made public immediately. This was and continues to be an aim of the emergency TB response in PNG. There is a wealth of data from Daru and critical lessons learned that are generalisable to NCD and other parts of PNG, and globally, and which should inform the proposed new DFAT TB support design from 2020.

In NCD data is being collected separately by the implementing partners. The new electronic platform being rolled out by mid-2019 has an aim of ensuring local ownership and a health system strengthening approach (integrating with GOPNG systems) to transform accuracy and overcome the current disconnects between the various data sets.

In Daru, data platforms were built, inter alia, as part of the emergency response for (i) accurate reporting of TB testing, (ii) the numbers of patients infected and (iii) those successfully treated, and they have been a critical part of the success of the response. Important lessons learned relate to data ownership and use, and its integration with PNG systems.

First, data collection processes, data use and data ownership need to be crystal clear and formally agreed as part of their design. Data ownership – and therefore who can use which data for what - is sensitive due to past ambiguities. Sensitivities could potentially limit the excellent data, analysis and monitoring gains to date including locally-led research (see section 1.10.2 below). To address this there is a WP Data Utilisation Agreement and a WP Data Transition Plan. Both need formally agreeing



as a matter of urgency, including agreeing the associated funding and technical issues. In NCD data is being collected separately by partners and there may be similar potential future difficulties. As input to the roll-out of the new electronic platform in NCD, an independent assessment in NCD of data ownership, use and access may be wise. Second, data platforms should be built that can be integrated into PNG systems for sustainability. The review also recognises, however, that an emergency response requires emergency solutions to generate data, but that as soon as practicable data sets should be streamlined and integrated into local systems as is planned in NCD in 2019 and as is being worked towards in Daru.

#### 2.5.2. Research

Operational research is critical to inform the continuing response in WP, NCD, the rest of PNG and globally in the effort to contain TB. The world class results in Daru are a source of inspiration and motivation that MDR-TB can be controlled in a low resource setting and rigorous research enables evidence-based dissemination of information to assist elsewhere. There are two major research articles from Daru in press and another in progress on the TB patient journey in PNG. The research is led by WP PNG health leaders with the support of Burnet and are keenly awaited. Support for operational research is part of the specific remit of the Burnet Institute in its role as a WP implementing partner. The paediatric pharmacological research in NCD through the TB ChildFund Project has yielded valuable information. Other research should be anticipated and encouraged.

Research should continue to be a strong focus in DFAT-supported investments in WP and in NCD, led by PNG health leaders with the support of implementing and other technical partners, to inform the continuing TB response in PNG and to contribute to global knowledge. Building local capacity for research should continue to be part of DFAT-funded support in its TB investment design from 2020. DFAT may wish to consider supporting an annual PNG TB-specific research forum, which is currently under discussion. The specific aims could be to (i) develop a TB research agenda, agreed by all, for, say the next three years including (ii) a capacity development plan for its achievement, and (iii) with the research agenda and capability development plan reviewed and updated annually. This process and outcome would remove the current concern of some about who is doing what research for what purpose using whose data. It would achieve full transparency on all TB-related research in PNG within a focused and cohesive approach.

### 2.6. DFAT investment from 2020

The review notes (i) the gravity of the TB situation in PNG and its profound potential to undermine social and economic development in PNG as well as biosecurity risks and (ii) that purposeful DFAT TB support to GOPNG will be needed for the next 7-10 years, at least.

The review proposes a well-designed, cohesive DFAT-funded TB program for support to GOPNG from 2020 that incorporates all DFAT TB investments in PNG, and that has a strong, integrated, overarching monitoring and evaluation framework, aligned with the new national TB plan and the DFAT Health Portfolio Plan (HPP). Watch points that the new DFAT design should consider are the roll-out of the programmatic emergency response to the rest of WP; the high number of primary MDR-TB and XDR-TB patients in Daru; the small number of patients on the shorter MDR-TB regimens (11%) in Daru and the implications of the new WHO guidelines in both WP and NCD and scale up to newer TB drugs; the poor DGH infrastructure other than that from TB-related funding by DFAT; provincial TB coordination; TB clinical service delivery at DGH; laboratory systems; and uptake of and adherence to new guidelines and policies.

The focus of future DFAT support should continue to be national (including WHO and laboratories), Daru and the WP roll out, and NCD (including through the co-funding of the WB loan). Any expansion should be guided by the analysis underpinning the development of the new GOPNG national TB plan in Q2 and Q3 2019, and the envelope of available DFAT TB investment funds so as not to dilute current

effort. The review notes the importance of maintaining continuity of DFAT's support to the TB response given much of the DFAT funding finishing in September and December 2019, and thus tight time lines to design, tender and mobilise a new TB investment design. Timelines are compounded by the new national TB strategic plan not anticipated until September 2019 at the earliest given this is a framework for and input to the new DFAT TB investment design. The review recommends a series of initiatives for DFAT support as inputs to the design process (see section 3, Recommendations, below).

The design process could begin in May/June 2019, but this makes alignment with the planned new PNG national TB plan problematic. If the design process started in August/September it could include involvement in final discussion of the draft plan and supporting the development of the consequent NCD and WP TB plans, with the design being generated through these processes.

There should be no gap between current DFAT-funded efforts and those to come given the potential impact on the emergency response. The review therefore suggests (i) that DFAT consider a start date of the new DFAT TB investment of 1 March 2020 and (ii) extension of current TB investment arrangements until then in Daru/WP and (in negotiation with the World Bank) for NCD. Possible time frames for the new DFAT design for TB investment from 2020 are in Table 6.

**Table 6: Possible DFAT TB investment design timelines**

| Date               | Input   | Output   |
|--------------------|---|--|
| (Late) August 2019 | 1 <sup>st</sup> design mission following GOPNG-led joint TB review and the development of new TB national strategic plan in draft | Base line analysis for new DFAT design; draft design for consultation (work-shopped when in-country; documentation 2 weeks after design mission) |
| October 2019       | 2 <sup>nd</sup> design mission including supporting WP and NCD finalise their TB strategic plans if needed                        | DFAT draft finalised for GOPNG and DFAT approval (work-shopped when in-country; documentation 2 weeks after design mission)                      |
| Nov/December       | DFAT investment design tendered   | Successful tenderers announced   |
| January/February   | Mobilisation planning   | Mobilisation plans agreed by GOPNG and DFAT  |
| March 1            | Teams mobilised   | New DFAT TB investment begins  |

### 3. LESSONS LEARNED

There is a wealth of lessons learned to guide future TB control in Papua New Guinea, and DFAT TB investments in PNG and other countries.

#### *On supporting the Western Province and Daru Response*

- 1. Strong and consistent leadership at the local level as well as the national level is needed to sustain and continuously improve an effective TB emergency response.** Many informants contrasted the 2014-2016 period in WP with a Provincial TB Coordinator or acting coordinator with the subsequent period of no TB Coordinator. The benefits included effective coordination between Province and NDOH, regular effective meetings of the TB Core Group, and clear coordination of the DFAT funded partners.

#### *On an Effective TB and MDR TB Emergency Response*

- 2. TB in Papua New Guinea remains a serious socioeconomic and biosecurity threat and a focused and purposeful national TB response supported by development partners including DFAT will be required for some years to come.** The incidence of TB cases in Daru has been stabilised but remains high with high community infection transmission especially for MDR-TB, the NCD response is in its early stage, and there continues to be a high level of TB generally within the community in WP and NCD. The outbreak in Daru **perhaps** has been contained, but not reversed and has not been contained in the rest of WP. The outbreak in NCD has not

been contained yet. Continued emergency response is required to bring the incidence of MDR-TB down, and to address the underlying infection and socio-economic drivers.

3. **The emergency response in Daru demonstrated a set of critical elements that enable an effective emergency response to TB, that can inform future efforts elsewhere in PNG.** These critical elements include investment in the right infrastructure (MDR-TB wards and isolation rooms), laboratory diagnostic capacity, uninterrupted medical supplies, development of relevant national protocols and guidelines, recruitment and training of health workers, screening, and an effective patient management data collection system used well.
4. **Close cooperation between hospital care and the community response is essential based on a patient-centred approach through the patient journey.** In Daru the effective combination of the DGH MDR-TB ward and the DART sites in the community have been essential to effective delivery of DS-TB and MDR-TB treatment by hospitalising only when necessary and ensuring TB treatment is as close to people's homes as possible. In NCD this is yet to be fully realised and is in the very early stages of rolling out to the rest of WP. In both DGH and PMGH a stronger hospital system oriented, patient journey approach would be beneficial.
5. **Guidelines, treatment protocols, education and local capacity building and close cooperation between hospital care and community response is essential, based upon a patient-centred approach through the patient journey.** The success of the Daru model includes having and adhering to relevant guidelines, protocols and procedures (drawing on best evidence and most recent WHO guidelines), the training of staff, and the development of systems that interface the hospital and community elements. It also requires continual vigilance to ensure protocols are adhered to, standards are met (e.g. GeneXpert test results on the same working day) and to embed the model within the broader hospital staff and leadership (importantly including those new), not just the TB staff, so that all own it, support it, benefit from the training it brings and contribute to world class results as a system response.

*For the future DS-TB and MDR-TB Emergency Response*

6. **As the emergency response progresses health system strengthening, and the social determinants of health and well-being need to be addressed if results are to be sustained over the long-term and TB full controlled or eliminated.** While DFAT's initial investments rightly focused on getting MDR-TB under control - a vertical disease response - health system strengthening opportunities need to be inbuilt (e.g. for data collection and use, effective hospital management) and expanded over time (e.g. integrated primary health care) as well as poor living conditions addressed, lack of clean water and sanitation, and health system fragility generally as all pose a risk to sustainable TB control. Future phases of support will need to increasingly address these in PNG.
7. **Notwithstanding the emergency response the rest of the health system still needs to function well and must not be neglected.** A hospital TB ward is part of a hospital system that supports the patient journey, and does not float in a vacuum, and as such its effectiveness is predicated upon the on-going effective functioning of the hospital. The current imbalance in DGH for example, between the MDR-TB capability and resources, and the rest of the hospital, notwithstanding poor TB X-ray capacity, is a cause of some irritation by some, deflects resources from other hospital services and undermines sustainability. In PMGH the three-week waiting times for TB test results, X-ray capacity being overloaded with TB patients and inconsistent TB infection control carries the same risk.

8. **Where a society is patriarchal as in much of PNG, strong male engagement and participation as TB champions for community advocacy, information and education and for patient treatment, care and support may be beneficial.** In societies where men tend to be the household decision makers their voice on health seeking behaviour (for example during early stages of symptoms), awareness of TB and advocacy for TB screening could accelerate the process of finding and treating TB.

#### *On DFAT Support for TB Control in Western Province*

9. **As an emergency response evolves it is important at some stage for DFAT to take stock, set clear objectives and targets, hold implementers accountable for delivery of outcomes, and review progress against them regularly.** The absence of a clear statement of desired objectives and outcomes and a clear framework to monitor progress, can limit the ability of partners to assess whether they are on-track or meeting their objectives. It dilutes accountability for achieving outcomes and instead puts the focus on accountability against activity-based reporting. More frequent (annual or biannual) independent reviews, against a clear design and monitoring and evaluation framework, would allow stronger tracking of progress and oversight by DFAT, and therefore by all partners.
10. **Energy and goodwill are needed to ensure the development and maintenance of good relationships to contribute to a successful TB response. This could be further enhanced with clearer management and accountability structures.** There are numerous examples of DFAT-funded partners and local partners collaborating on a daily basis to get the job done. There are also examples where effective local leadership together with a clearer management structure for DFAT-funded partners – not separately reporting to DFAT - that allows planning, budgeting, and operational decision-making as close as possible to the location of the response would reduce tensions, competition, disagreements, misunderstandings and conflict. In NCD, partner coordination is complex, and it would be timely to proactively assess mechanisms in 2019 to ensure this is avoided.

## **4. RECOMMENDATIONS**

### **Recommendations**

The recommendations are presented below within six broad strategies, are based on the review findings and draw on lessons learned (see Section 3). The recommendations require the decision or agreement of GOPNG at national, provincial or hospital level working in partnership with DFAT and with DFAT support, and then supporting actions by local PNG leaders, DFAT and the DFAT-funded implementing partners. Once decisions are taken by NDOH, WP, NCD (etc.) the DFAT implementing partners should be requested to adjust their 2019 work plans and those beyond, to support implementation of the recommendations.

### **TB and Health System Strengthening**

1. **Maintain the focus, intensity and financial support of the TB emergency response and do so in a way that increasingly invests in strengthening the underlying health system for sustainability in containing and reversing TB:**
  - i. Develop Daru and NCD as centres of excellence including training sites for clinical management of MDR-TB and operational research.
  - ii. Build in early adoption of changing evidence-based practice across PNG (such as all-oral short MDR-TB treatment regimens and treating latent TB) in the new National TB plan from 2020.

- iii. Fast-track TB elimination in feasible locations (such as Daru Island) in the new National TB plan from 2020.
- iv. Consider opportunities for using the excellent TB outreach platform to strengthen integrated primary health care including immunisation as the TB response matures, starting in Daru from 2019.
- v. Develop a national policy and guidelines on TB infection control based on the patient journey in community care and in hospitals including the training of multidisciplinary health care workers, community and patients in 2019.
- vi. Link TB initiatives with the DFAT co-funded (with ADB) Health Services Sector Development Program (HSSDP) where appropriate, such as data management and leadership and management development of national and local PNG TB leaders from 2019.

### **Effectiveness and Efficiency**

#### **2. Implement a set of actions and adjustments that will increase the effectiveness and efficiency of current national, provincial and DFAT funding for TB in WP and NCD to maximise outcomes.**

- i. Develop a targeted strategy to support implementation of the new 2019 WHO TB guidelines including capacity building and strengthened compliance monitoring.
- ii. Establish a standard of same-day return of GeneXpert tests results beginning in WP (DGH) and NCD (PMGH and NCD community centres) in Q2 2019 (informed by root cause analyses of current delays, provide additional GeneXpert machines where required or their redistribution and training) from Q2 2019. .
- iii. Strengthen continuous professional development in TB including for all senior health people – managers, medical, nursing - soon after their appointment.
- iv. Establish and strengthen referral and patient tracing mechanisms from PMGH TB outpatients (adult and paediatric) to community-based care and outreach and between the three community-based NCD services drawing on lessons learned in Daru, commencing in Q2 2019.
- v. Review the effectiveness and impact of mobile TB screening in Daru in Q2 2019 to guide future systematic TB screening in WP and NCD (and elsewhere in PNG as appropriate), with a view to a strong systematic approach in both WP and NCD purposefully targeting high-risk groups with speedy rollout to all the population including GeneXpert Ultra for more sensitive testing and offer TB preventative therapy to those infected.
- vi. Implement first and second line LPA testing at CPHL to move away from using Queensland testing facilities and initiate patients on appropriate treatment regimen based on sensitivity patterns in Q1 2019.
- vii. Review efficiency opportunities for TB home visits in Daru and NCD, including the treatment supporter system, in Q2 2019.
- viii. Review the effectiveness of patient enablers (meals, food vouchers and bus fares) in improving patient adherence.
- ix. Update drug ordering to reflect new WHO guidelines and support and monitor to decrease risk of over or under supply from Q2 2019.
- x. Analyse TB bed utilisation needs at DGH given the WP TB response roll-out, in 2019.

- xi. Conduct a root cause analysis of the high LTFU in NCD to support both strengthening and accelerating the TB response, in Q2 2019.

### **Leadership and Governance**

3. **Strengthen the leadership and management of the TB response in WP and NCD to ensure that all partners are working well together towards agreed high level targets and indicators and common objectives.**
  - i. Strengthen the strategic focus of the WP Core Group and its use of data for monitoring from Q2 2019.
  - ii. Fill the WP provincial TB leadership position.
  - iii. Analyse and augment where needed implementing partner coordination mechanisms for NCD and WP in Q2 2019 including (i) ensuring clear lines of local management accountability, and (ii) developing processes for joint annual planning of implementing partners with an integrated results framework and strong M&E and (iii) consider an annual TB technical exchange workshop (involving other provinces as relevant).
  - iv. Capitalise on HSSDP initiatives including all key players participating in its governance, leadership and management development programs from 2019.

### **Data and Research**

4. **Invest in enhanced data collection and analysis for a data-informed approach nationally and locally to guide planning, monitoring and implementation and continuous improvement.**
  - i. Formalise and implement the WP Data Utilisation Agreement and WP Data Transition Plan in Q1 2019.
  - ii. Assess data ownership, access and use in NCD to ensure no similar issues to WP, in Q2 2019.
  - iii. Conduct economic analyses of the TB response annually in WP and NCD and monitor trends from 2019, complementing the optima decision science tool.
  - iv. Incorporate investment in enhanced data collection and analysis in the new national TB strategic plan to be developed in 2019.
  - v. Support an annual TB research forum to develop a rolling three-year TB research agenda, agreed by all and a capacity development plan for its achievement, both to be reviewed and updated annually (from 2019).

### **Gender and Social Determinants**

5. **Invest in better understanding the social and gender dynamics around TB infection and health seeking behaviour to guide targeted interventions.**
  - i. Ensure all data are sex disaggregated and used for all reporting and monitoring, from Q2 2019.
  - ii. Invest further in studies, research and analyses to understand (i) whether the demographic profile of those diagnosed with TB matches the profile of those infected with TB and (ii) the TB health seeking behaviours of men and women from 2019.

**6. Advocate for funding for investments with long term impact on TB fundamentals: investments in the underlying social determinants that create an environment where TB flourishes.**

- i. Engage with the commercial sector for their support to GOPNG to reduce crowded housing and improve living conditions in WP and NCD (from 2019).
- ii. Consider embedding health improvement initiatives in all DFAT economic programs and discussing a cohesively similar and synergistic approach with development partners (from 2019).

**Future DFAT Support**

**7. Given the gravity of the TB situation in PNG, DFAT continue its TB support for 7-10 years using a comprehensive program approach incorporating all DFAT TB funding, with a clear, integrated results and monitoring and evaluation frameworks, clear management and accountability arrangements, and strong focus on local leadership.**

In addition to the recommendations above, DFAT consider, in 2019, as inputs to the proposed 2020-2025 DFAT TB investment design:

- i. Reducing LTFU in NCD
  - Commission an analysis of (i) the disconnect between PMGH paediatric and adult outpatients and community-based services and outreach in NCD in Q2 2019, and (ii) providing expert resources to develop efficient referral mechanisms in Q2/3 2019.
  - To support this, invest in the Child Fund TB Project at PMGH to provide training on TB paediatric care to community-based implementing partners in NCD during 2019 and beyond.
  - Include in implementing partner discussions in NCD, and in contracts as required, the need for interdependence across boundaries for patient flows and good referral mechanisms including between community-based services and they and PMGH to aid service coordination and the patient journey.
- ii. Use the planned Daru and NCD behavioural study led by the PNG Institute of Medical Research to inform the proposed design.
- iii. Assess DGH infrastructure improvements possibilities including staff accommodation.
- iv. Commission a root cause and economic analysis on patient flow to maximise TB X-ray efficiency in PMGH.
- v. Commission a root cause analysis towards achieving GeneXpert same day turn-around-time of test results (community and hospitals).
- vi. Require integrated annual planning and M&E of the implementing partners in WP and in NCD.
- vii. If the WP TB leadership position remains unfilled, designate one of the three implementing partners to act as local leader of the WP implementing partners in the interim.
- viii. Request relevant implementing partners to include TB training for multidisciplinary staff along the patient journey in hospitals in their 2019 work plans.

- ix. Review the cost imposts on WP for patient transfers from Queensland Health facilities such as those nearby in the Torres Strait.



## ANNEX 1: TERMS OF REFERENCE (SUMMARY)

|             |  |
|-------------|--|
| Title:      | Papua New Guinea TB Investment Review  |
| Program:    | PNG TB program, DFAT PNG   |
| Location/s: | Port Moresby and Daru Island, Papua New Guinea (PNG), plus home desk-based   |
| Term:       | Up to 34 days plus a possible additional 6 days for second trip to PNG if required.  |
| Background: | <p>The Specialist Health Service (SHS) provides strategic input on health to the Australian Government Department of Foreign Affairs and Trade (DFAT). The SHS allows DFAT to source high quality technical advice to support health policy, strategic planning and health programming across the aid management cycle.</p> <p>Papua New Guinea is an independent democracy and Australia’s closest neighbour, with less than four kilometres separating it from Australia at the nearest point. Its capital, Port Moresby, is about an hour’s flying time from Cairns. PNG has a population of approximately 7.7 million. Papua New Guinea is one of the most culturally diverse countries in the world. Most people living in PNG are Melanesian; a few are Micronesian or Polynesian. PNG has over 800 known languages. English, Tok Pisin (Pidgin), and Hiri Motu (the lingua franca of the Papuan region) are the official languages. The PNG mainland and its six hundred islands have a total land area of 452,860 square kilometres.</p> <p>The spectrum of PNG society ranges from traditional village-based life, dependent on subsistence and small cash-crop agriculture, to modern urban life in the main cities. Some 80-85 per cent of the population directly derive their livelihood from farming, and 15-20 per cent of the population live in urban areas.</p> <p>While PNG is one of the world's fastest growing economies, 30% of the population still lives below the international poverty line of \$1.25 USD per day. Most people in Papua New Guinea still live on subsistence-based agriculture. The country has the highest incidence of HIV/AIDS in the Pacific.</p> <p>TB kills more people in Papua New Guinea than any other infectious disease. The problem is further compounded by high levels of drug resistant TB particularly in hot-spot areas, namely Daru of South Fly District in the Western Province, the National Capital District and the Gulf province.</p> <p>The Government of PNG and DFAT have invested significant resources to address Tuberculosis (TB) and Multi-drug Resistant (MDR) TB in Papua New Guinea since 2011. DFAT expenditure to date has been about \$54 million.</p> <p>DFAT is the lead external financier of activities to address TB in Western and National Capital District (NCD), and also provides significant support to WHO and will do so shortly with the World Bank.</p> <p>DFAT support to control TB in Papua New Guinea began in 2011, with a Foreign Minister commitment of \$60million. DFAT support began with support to Daru hospital and local work, and then increased rapidly in 2014 with a scale up in technical assistance and capacity building to the Western Province response.</p> <p>In 2016 alone DFAT supported Burnet Institute (\$2.1 million), World Vision (\$1.3 million), Queensland Mycobacterium Reference Laboratory (QMRL) (\$0.5 million), procurement and Child TB project (\$0.5 million) plus 23 locally engaged staff and 4 international advisers, plus its contribution through World Health Organization (WHO). DFAT expenditure on TB was \$5,787,484 in 2016/17 and \$9,072,958 in 2018/18 (with an additional \$10m on infrastructure). It is good practice to review the outcomes of these investments.</p> |

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|                                | <p>There has not been a formal independent review of implementation of the National TB Plan or of the emergency response, but there is good evidence, from the 2016 and 2018 WHO Regional Green Light Committee (rGLC) reviews, that good progress has been made in TB control in Western Province.</p> <p>Available data from Daru and South Fly District in Western Province suggests that:</p> <ul style="list-style-type: none"> <li>• There have been increases in case notification;</li> <li>• Improvements in TB treatment close to 80% and reductions in deaths and loss to follow up in both drug sensitive (DS) and drug-resistant (MDR) TB;</li> <li>• Stable level of new cases of MDR TB;</li> <li>• High number of new cases of MDR TB with no contact to existing patients, suggesting many primary cases, high latent TB;</li> </ul> <p>The purpose of this review of DFAT investments would not be to re-assess the rGLC review, but to explore the contribution of the DFAT investments to these achievements from 2011 until 2018 and make recommendations on how DFAT investments can contribute to the development of the next national TB program, due after 2020.</p> <p>The review will include how DFAT and the DFAT funded partners have participated in and contributed to TB control coordination mechanisms, working groups and efforts at national and provincial level, given DFAT is a major stakeholder in PNG's TB response.</p>  |
| <p>Purpose and objectives:</p> | <p>The objective of this review is to understand and document the outcomes of the DFAT funded TB control activities in PNG from 2011 to 2018, to assess what factors contributed to this impact, and learn lessons for future of the Australian DFAT investments in TB control in PNG.</p> <p>The timing of this review is such that it should provide lessons that can inform the design of the next phase of DFAT support for TB control from 2020 onwards, the DFAT-funded parallel financing of the Emergency Response Program (World Bank loan) as well as for PNG's next national TB plan (due after 2020). The review findings will also contribute to future governance, oversight, management and partner coordination arrangements.</p> <p>The review framework and key questions are guided by the 6 elements in the DFAT Monitoring and Evaluation (M&amp;E) guidelines and the intention of learning lessons to inform future DFAT investments. There is also a seventh element on governance, management and partner coordination. The review will draw upon (rather than duplicate) evidence from recent relevant reviews including the rGLC review mission report of June 2018.</p> <p>The review will use as its starting point the earliest DFAT ministerial statements on TB commitments, internal approval memos and subsequent workplans and reports.</p> <p>Elements for review:</p> <ol style="list-style-type: none"> <li>1. <u>Relevance</u> <ul style="list-style-type: none"> <li>• Were the DFAT investments focused on the right issues to address the TB epidemic in PNG?</li> </ul> </li> <li>2. <u>Effective</u> <ul style="list-style-type: none"> <li>• Did the DFAT funded investments achieve the desired results and outcomes?</li> <li>• What results and outcomes did the DFAT funded investments achieve or contribute to? (note here to primarily explore contribution and to the extent possible, attribution)? This can draw upon the rGLC report.</li> </ul> </li> </ol> |

|                 |  |
|-----------------|--|
|                 | <p>3. <u>Efficient</u></p> <ul style="list-style-type: none"> <li>• Where the results and outcomes achieved in the most efficient way?</li> <li>• Value for money of relative TB control investments and actions?</li> <li>• (this will explore efficiency in individual investments as well as the sum total of all DFAT investments)</li> </ul> <p>4. <u>Impact</u></p> <ul style="list-style-type: none"> <li>• What was the impact of DFAT investments? (in terms of contribution to higher level impact – health outcomes)</li> </ul> <p>5. <u>Sustainability</u></p> <ul style="list-style-type: none"> <li>• Will the project achievements be sustained? (health improvements or systems capacity building)?</li> </ul> <p>6. <u>Gender and social inclusion</u></p> <ul style="list-style-type: none"> <li>• What was the outcome of the investments in terms of women’s and men’s access to TB treatment and care, and the role of women in leading and delivering TB control activities?</li> <li>• How did the DFAT investments benefit the poorest?</li> </ul> <p>7. <u>Governance, management and partner coordination</u></p> <ul style="list-style-type: none"> <li>• How did DFAT investments align with national, provincial and district TB control plans?</li> <li>• How are DFAT investments contributing to governance, management and coordination arrangements in Western Province, NCD and nationally?</li> <li>• How are the management arrangements performing to allow clear, effective, accountable management of all the TB development partners activities?</li> <li>• Coordination and complementarity with Global Fund supported TB activities?</li> </ul> <p>The scope of the review will be all DFAT investments in TB control in PNG from 2011 to 2018. This will include national, provincial (primarily NCD and Western Province) and district level investments against the partners and activities outlined in <u>Annex 1</u>. The review will also explore how DFAT support has coordinated with other major partners, including the World Bank and the Global Fund to Fight Aids, Malaria and TB Global Fund investments.</p> |
| Review Approach | <p>The review team will have the following composition:</p> <ol style="list-style-type: none"> <li>1. <u>Team Leader</u> with expertise in multi-partner, multi-stakeholder programs – linked to Element 7</li> <li>2. <u>TB Specialist</u> with expertise in TB control programs – linked to Elements 1, 2 and 4;</li> <li>3. <u>Finance Specialist</u> with expertise in financial and value for money evaluations – linked to Elements 3, 4 and 5;</li> <li>4. <u>Social Inclusion and Gender Specialist</u> – linked to Elements 2, 4 and 6 and for cross-cutting integration with the work of all.</li> </ol> <p>The DFAT-contracted health adviser will act as a strategic adviser to the review, working with the team leader.</p>  |

In undertaking the review, it is proposed that the team will:

- Consult with DFAT program staff, health advisors and team members of linked programs.
- Conduct a desk review of relevant documentation, including but not limited to documents included in the reading list- [Annex 4](#).
- Develop a review plan, which will include methodology and report outline, indicate how the specific questions listed in the “purpose/objectives” section above will be addressed and identify key respondents and further documentation as required.
- Undertake a first in-country visit to gather data in line with the review methodology, including a visit to NCD and Western Province.
- Develop an aide memoire summarising the key findings and recommendations to be presented at the debrief with key stakeholders in PNG.
- Draft a report for DFAT and NDOH detailing the key findings and recommendations
- If necessary, undertake a second in-country visit to present, discuss and refine as required draft findings.
- Draft a final report for DFAT and the NDOH detailing the key findings and recommendations.

The review will commence no later than 5<sup>th</sup> November 2018 with the final report completed by February 2019 (TBC).

## **ANNEX 2: TB REVIEW PLAN**

### **TB PREVENTION AND CONTROL IN PNG**

#### **REVIEW OF CONTRIBUTION OF DFAT INVESTMENTS**

**2011-2018**

**REVIEW PLAN: 20 November 2018**

## Purpose

The purpose of the evaluation plan is twofold: (1) to inform the processes of the review of TB control in PNG funded by DFAT of its achievements to date and (2) ensure the approach is satisfactory to the Australian Department of Foreign Affairs and Trade (DFAT) in Papua New Guinea (PNG). The evaluation plan includes the schedule of visits for the review, consultations and other data collection activities.

## Program

Tuberculosis (TB) is one of the seven program priorities in the PNG National Health Plan (NHP) 2016-2020 and reducing the burden of communicable diseases is one of the eight key result areas in the NHP. Since 2011 DFAT has been the lead external financier of activities to address TB in Western and National Capital District (NCD) in PNG, in partnership with the government of PNG. DFAT also provides significant support to the TB and other work of the World Health Organization (WHO) and will shortly provide investment funds to the World Bank. DFAT expenditure to date has been about \$54 million. Initial support in 2011 was \$60million including to Daru hospital in Western Province (WP). Support increased rapidly in 2014 with a scale up in technical assistance and capacity building to the WP response.

In 2016 DFAT support for TB prevention and cure in PNG included to the Burnet Institute (\$2.1 million), World Vision (\$1.3 million), its contribution to the WHO, the Queensland Mycobacterium Reference Laboratory (QMRL) (\$0.5 million), the Child TB project (\$0.5 million), plus 23 locally engaged staff and 4 international advisers. DFAT expenditure on TB was \$5,787,484 in 2016/17 and \$9,072,958 in 2018/18 plus \$10m on infrastructure).

## Review

The purpose of the review is to assess the contribution of DFAT investments to achievements in TB prevention and control in PNG since 2011, and identify lessons learned to inform future DFAT investments in TB in PNG. It is the first DFAT-initiated review of DFAT TB investments in PNG since 2014. The review will apply contribution analysis and other methodologies to this (see Section 6 below, *Methodology*) and to the findings of the WHO Regional Green Light Committee (rGLC) reviews in 2014 and 2016, to determine the DFAT contribution and lessons learned. This will assist deep contextual understanding, with the research and analysis starting with the earliest DFAT ministerial statements on TB commitments, internal approval memos, subsequent work plans and reports and other relevant documents.

The findings from the rGLC reviews suggest that while there is progress the situation remains complex. For example, the rGLC found that:

- There have been increases in case notifications;
- Improvements in TB treatment close to 80% and reductions in deaths and loss to follow up in both drug sensitive (DS) and drug-resistant (MDR) TB;
- Stable level of new cases of MDR TB;
- High number of new cases of MDR TB with no contact to existing patients, suggesting many primary cases, high latent TB.

## Focus and Scope

### Overall

The scope of the review is all DFAT investments in TB control in PNG from 2011 to 2018. The scope includes national, provincial (primarily NCD and Western Province) and district level investments against the partners and activities outlined in Annex 1. The scope also includes how DFAT support has

coordinated with other major partners, including the World Bank and the Global Fund to Fight Aids, Malaria and TB Global Fund investments. The lessons learned and recommendations will inform the design of the next phase of DFAT support for TB control from 2020 and the DFAT-funded parallel financing of the World Bank loan for the Emergency Response Program.

### **Australian Aid**

The review will align with key policy documents for Australian Aid generally and in PNG specifically. These will include but may not be limited to the *2017 Foreign Policy White Paper*, the *2018–19 Department of Foreign Affairs and Trade Corporate Plan*, the *2014 Making Performance Count*, the *2015 DFAT Health for Development Strategy*, the *2016 Gender Equality and Women’s Empowerment Strategy*, the *2016-2020 Strategy for Strengthening Disability Inclusive Development in Australia’s Aid Program*, and the *2017 DFAT Monitoring and Evaluation Standards*, and the *DFAT 2018 PNG Health Portfolio Plan (HPP)*.<sup>35</sup>

The review will mainstream gender and disability issues and data wherever possible and will be guided by the gender and equity expert on the review team.

The review will also pay particular attention to operating effectively in the changing geopolitical landscape in PNG, as reflected in the *2017 Foreign Policy White Paper* and the *2018-2019 Corporate Plan*. The review will ensure it contributes to effective Australia and PNG relationships as the higher order goal. We note the importance of Australia’s support to fighting the threat of TB to contribute to sustainable economic development and poverty reduction (reflected in the corporate plan) and see this review as an important contributor to this.

The review team has a high level of capacity and capability. It will delight in contributing to the ‘soft power’ focus of DFAT, through creativity of thinking and the generation and sharing of ideas to influence the behaviour and thinking of those it consults and engages with during the review.

The power of health programs to enable development is the subject of DFAT’s *Health for Development Strategy 2015-2020*. The review team will be particularly mindful of the *2018 HPP* and its implications for possible lessons learned for the future.

### **Themes**

The review team will develop themes to guide its analysis to ensure alignment with the key Australian and PNG government documents.

### **PNG Context**

The review team will be mindful of contextual matters since 2011 to ensure realistic analysis. Contextual changes include the current decentralisation of PNG’s health system to provincial health authorities. Ongoing matters include pharmaceutical supply chain challenges, a health workforce crisis, insufficient and fragmented health budgets, the proximity of Australia to Daru and increased population density on Daru.

## **Audience**

### **Accountability**

The accountability of the review team is to Andrew Dollimore, First Secretary (Public Health), Australian High Commission, PNG. The accountability to SHS is through Samantha Colquhoun, International Health Specialist.

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<sup>35</sup> Government of Australia (DFAT). 2014. *Australian aid: promoting prosperity, reducing poverty, enhancing stability*. Canberra, Australia; Government of Australia (DFAT). 2018. *Department of Foreign Affairs and Trade Corporate Plan*. Canberra, Australia <https://dfat.gov.au/about-us/publications/Documents/corporate-plan-2018-19.pdf>

## **Key stakeholders**

Key stakeholders include representatives of the PNG, WP and NCD governments, the Burnet Institute, World Vision, WHO, QMRL, the community in WP and NCD, health staff and staff directly contracted through the DFAT investments.

## **Broader audience**

The broader audience will be at DFAT's discretion but may include other bilateral donors and multilateral organisations involved in TB in PNG, local and international organisations advocating for TB control, TB technical advisors and other experts within PNG and elsewhere and private sector representatives where appropriate.

## **Methodology**

### **Data gathering**

The review methodology will include contribution and attribution analysis within a framework of complexity theory and design constructs. Contribution analysis is the foundation of attribution analysis. Contribution analysis enables reasoning upon which to base plausible conclusions with a level of confidence, including to arrive at attribution or not. Complexity theory acknowledges that program and project outcomes are influenced by the interactions between people giving a dynamic and sometimes unpredictable quality to rational project and program designs. Design theory is described variously but may be described as a learning activity that is exploratory, evolutionary and constructive and leads to new thinking and new connections, associations and concepts.<sup>36</sup>

The consultants will gather data and information by analysing relevant documents, consulting with key stakeholders, seeking evidence in all its analyses. It will observe the physical settings where the program is delivered and engage with those delivering it and those who are recipients. Consultations will be both semi-structured interviews and unstructured conversations and discussions. Translators and note-takers will be used where necessary.

Analysis will triangulate sources of evidence to create plausible results chains leading to likely contribution of the DFAT investment to outputs and intermediate outcomes. Conclusions will reflect the degree of confidence of the reviewers in their analyses and evidence.

### **Data management and analysis**

Notes will be taken during all interviews and checked and expanded as soon as practicable. The review team will jointly review information at the end of each day to inform, test and refine conclusions. Issues to be clarified will be incorporated in future interviews and other processes as relevant (e.g. emails for clarification, technical data analysis, further document analysis). The discussions will be progressively aggregated against supporting data to guide conclusions.

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<sup>36</sup> Hodges, Peter et al. 2017. *Four Criteria for Design Theories*. *She Ji: The Journal of Design, Economics, and Innovation* Volume 3, Issue 1, Spring 2017, Pages 65-74 <https://www.sciencedirect.com/science/article/pii/S2405872616300995>



## Ethics

An explanation of the review and its purpose will be given to all those consulted. The report will name them and their position in a list of people consulted but their opinions and words will not be attributed to them such that they could be identified. The consultant team will not have any contact with children under age 18 except incidentally while they are in the presence of a parent or other adult carer.

## Constraint

There is a potential constraint to the review: the scope is broad; the review covers seven years and the review time available is limited. This may limit (i) the amount of data collected and analysed and (ii) conversely, the amount of time available to deeply analyse complex data or complex linkages between the data. To address this the review team has clear and complementary terms of reference, will have a pre-in-country planning meeting to maximise the operational aspects of these complementarities and efficient working processes. The report will indicate the level of confidence in the review conclusions and will reflect feedback from the aide-memoire presentation and the draft report where this would value-add.

## Questions

The framework for the evaluation questions and for the thinking of the review team will be based on the *2017 DFAT Monitoring and Evaluation Standards*, will incorporate a question on governance and management, and will be informed by the NHP and HPP. Data will be both quantitative and qualitative. The questions will include but will not be limited to:

### 1. Relevance

- Were the DFAT investments focused on the right issues to address the TB epidemic in PNG?
- Have the DFAT investments responded appropriately as new and improved data emerged on the spread of TB?

### 2. Effective

- Did the DFAT-funded investments achieve the desired results and outcomes?
- What results and outcomes did the DFAT funded investments contribute to in the rGLC reports?
- What results can be attributed to DFAT funding?
- Are there are other results now in the rGLC to which the DFAT investment contributed?
- What is the evidence?

### 3. Efficient

- Were the results and outcomes achieved in the most efficient way?
- Was there value for money of DFAT investments and actions in controlling TB?
- Are we working with appropriate partners and using appropriate modalities?
- What is the evidence?

### 4. Impact

- What was the impact of DFAT investments in terms of contribution to higher level impact including health outcomes?

- What is the evidence?

#### **5. Sustainability**

- Will the project achievements be sustained e.g. health improvements or systems capacity building (e.g. looking at variables such as finance, staffing, laboratory, drug procurement/supply, capacity and facilities of Daru General Hospital and in the community)?
- What strategies or actions are needed to increase the likelihood of sustainability?
- What is the evidence?

#### **6. Gender and social inclusion**

- What was the outcome of DFAT investments for access of women and men to TB treatment and care, and the role of women in leading and delivering TB control activities?
- How did the DFAT investments benefit the poorest, those most vulnerable?
- How have program objectives and activities addressed gender equality and women's empowerment, including reduction in risk of gender-violence?
- What benefits have been achieved or are on track to being achieved?
- What, if anything, could be done within the program to enhance gender equality and women's empowerment?
- What is the evidence?

#### **7. Governance, management and partner coordination**

- How did DFAT investments align with national, provincial and district TB control plans?
- How are DFAT investments contributing to governance, management and coordination arrangements in Western Province, NCD and nationally?
- How are the management arrangements performing to allow clear, effective, accountable management of all the TB development partners activities?
- How good and effective was/is the coordination and complementarity with Global Fund (and other major donor) supported TB activities?
- What is the evidence?

## ANNEX 3: PEOPLE CONSULTED

### PEOPLE CONSULTED

| Name (title)          | Position  | Organisation                           |
|-----------------------|---|--|
| Paison Dakulala (Dr)  | Deputy Secretary  | National Department of Health (NDoH)   |
| Paul Aia (Dr)         | Program Manager   | National TB Program, NDoH              |
| Margret Kal (Dr)      | Medical Officer   | National TB Program, NDoH              |
| Robin Yasi (Dr)       | Medical Officer   | National TB Program, NDoH              |
| Kimberly Kawapuro     | Secretariat of ERT / Public Relation Officer                        | TB Emergency Response Team (ERT), NDoH |
| Ben David             | Minister Counsellor   | DFAT                                   |
| Will Robinson         | Counsellor, Public Policy and Health Security                       | DFAT                                   |
| Chris Sturrock        | Former Counsellor in PNG  | DFAT                                   |
| Andrew Dollimore      | First Secretary (Public Health)                                     | DFAT                                   |
| Catherina Habon       | Senior Program Manager (Health)                                     | DFAT                                   |
| Israel Naramen        | TB Coordinator  | National Capital District Health       |
| Niko Wuatai (Dr )     | Director Public Health  | National Capital District Health       |
| Morimai Ipai (Dr)     | Director, Disease Control   | National Capital District Health       |
| Alice Honjepari       | Provincial Health Coordinator                                       | Western Provincial Health Office       |
| Lucy Morris           | Rural Health Services Coordinator                                   | Western Provincial Health Office       |
| Stenard Hiasihri (Dr) | Former Provincial TB Physician for Western Province                 | National Department of Health          |
| Jennifer Banamu       | TB Scientist in Charge  | Central Public Health Laboratory       |
| Karen Johnson         | Laboratory Advisor  | Central Public Health Laboratory       |
| Paki Molumi (Dr)      | Director, Medical Services  | Port Moresby General Hospital (PMGH)   |
| James Amani (Dr)      | President of the PNG Paediatric Society, PMGH/ Child TB project     | PMGH                                   |
| Rendi Moke (Dr )      | TB Medical Officer  | PMGH                                   |
| James Amani (Dr)      | President of the PNG Paediatric Society/ Child TB Project           | PMGH                                   |
| Henry Welsh (Dr)      | Assistant Professor of Paediatrics and UPNG-SMHS / Child TB Project | PMGH/Baylor College of Medicine        |
| Dorcas Nunisa         | Data Officer, Child TB Project                                      | PMGH                                   |
| L Oeica (Sr)          | Paeds Cons Clinic, Child Fund TB Project                            | PMGH                                   |
| Evelyn Pereap (Sr)    | Paeds TB , ChildFUND TB project                                     | PMGH                                   |
| Allanie Rero (Dr)     | Paediatric TB Ward, Child Fund TB project                           | PMGH                                   |
| Verlyn Apis           | HCO Paeds TB, Child Fund TB Project                                 | PMGH                                   |
| Tmeae (Sr)            | Paeds TB Nursing Office, Child TB Project                           | PMGH                                   |
| Michael Lundy (Dr)    | Paediatrician, Child TB Project                                     | PMGH                                   |
| Comelua Kilaley (Dr)  | Paediatrician, Child TB Project                                     | PMGH                                   |
| Fred Aloma            | Paediatrician nurse, Child TB Project                               | PMGH                                   |
| Easter Pisoro (Sr)    | Paediatric Nurse, Child TB Project                                  | PMGH                                   |
| Filma Kuman (Sr )     | SCN, Child TB Project   | PMGH                                   |
| Dorcus Nunisa         | Data Officer, Child TB Project                                      | PMGH                                   |

| Name (title)             | Position  | Organisation  |
|--------------------------|---|---|
| Sr Orpah Tugo            | CEO   | Daru General Hospital (DGH)   |
| Benny Kombuk (Dr)        | Director of Medical Services  | DGH   |
| Mery Vireu (Sr)          | a/Director Nursing Services   | DGH   |
| Gibson Pawape (Dr)       | SSMO  | DGH   |
| Lorna Yokowar (Sr)       | A/Deputy Director Nursing   | DGH   |
| Lala Biama (Sr)          | Unit Manager TB Ward  | DGH   |
| Helen Melanie Gagole(Sr) | Care Taker Unit Manager   | DGH   |
| Paulus (Sr)              | Unit Manager Obstetrics and Gynaecology                               | DGH   |
| Sereu (Senior Nurse)     | Consultation Clinic Nurse,  | DGH   |
| Saia (Sr)                | OPD, Daru General Hospital  | DGH   |
| Emmanuel Hapolo          | Senior TB Health Extension Officer                                    | DGH   |
| Theodore Madike (Dr)     | Medical Officer   | DGH   |
| Evangeline Madike(Dr)    | Medical Officer   | DGH   |
| Sazah Omuzzay ( Sr)      | Quality Assurance, Daru General Hospital                              | DGH   |
| Idiri Dewi (Sr)          | Quality Assurance   | DGH   |
| Sileas Yufi              | Lab Manager   | DGH   |
| Roland Jonathan          | Lab Technician  | DGH   |
| Tau Kuriwam              | Manager X-ray   | DGH   |
| Tobias Tumbe             | Anaesthetics  | DGH   |
| Dore Peary               | GESI/FSC  | DGH   |
| Shirley Laho             | Pharmacist  | DGH   |
| Karen Jerry              | Pharmacy. Tech  | DGH   |
| Grace Sibala             | Nutritionist  | DGH   |
| Thomas Topeau            | Clinical Bio- Medical Tech  | DGH   |
| Asan Kowense             | Infection Control Officer   | DGH   |
| Joshua Meraveka          | Physiotherapist   | DGH   |
| Miriam Avae              | OIC TB Clinic, 6mile  | National Capital District Health, Six Mile Clinic   |
| Justina Wanaliu          | Lab Technician, Six Mile Clinic                                       | National Capital District Health, Six Mile Clinic   |
| Eddie Narahaua           | Lab Technician, Six Mile Clinic                                       | National Capital District Health, Six Mile Clinic   |
| Stella Madiowi           | Provincial TB Coordinator for Contact Tracing                         | NDOH<br><br>(Funded by the NDOH Emergency Response and contracting supported through HHISP) |
| Ken Tai                  | Provincial TB Outreach, South Fly District TB Control Officer (HHISP) |   |
| Ernestine Sabiyam        | DS TB Case Manager, Daru General Hospital                             |   |
| Norbert Lawrence         | TB Case Manager, Contact Tracing Team , Daru                          |   |
| Julie Sunakiyo           | MDR TB A/case Manager, Contact Tracing Team , Daru                    |   |
| Maryanne Haihuie         | TB Counsellor, Contact Tracing Team , Daru                            |   |

| Name (title)             | Position  | Organisation     |
|--------------------------|---|------------------|
| Theresia Haihuie         | TB Counsellor, Contact Tracing Team , Daru                                    |                  |
| Ikalka Billy             | Nursing Officer , TB Outreach , Daru  |                  |
| Sasa Utrima              | TB CHW, TB Out Reach, Daru  |                  |
| Harea Kaipo              | TB Nursing Officer Contact Tracing, Daru                                      |                  |
| Shantey Mobeya           | CHW – Contact Tracing , Daru  |                  |
| Dapeng Luo (Dr)          | Country Representative  | WHO              |
| Tauhid Islam (Dr)        | Coordinator, End TB and Leprosy Unit  | WHO              |
| Lungten Z. Wangchuk (Dr) | Medical officer   | WHO              |
| Richard Rehan (Dr)       | TB Medical Officer  | WHO              |
| Soleil Labelle           | TB Technical Officer  | WHO              |
| Anna Maalsen             | Team Leader, Health Systems and Social Determinates of Health                 | WHO              |
| Pieter Van Maaren (Dr)   | Head of World Bank Project Management Unit / Former WHO Representative in PNG | World Bank       |
| Jaime Bayona (Dr)        | Public Health Adviser, World Bank   | World Bank       |
| Aneesa Arur (Dr PhD)     | Senior Health Specialist and Task Team Leader                                 | World Bank       |
| Ms. Hope Phillips        | Consultant  | World Bank       |
| Suman Majumdar (Dr)      | Deputy Program Director   | Burnet Institute |
| Kudakwashe Chani (Dr)    | Country Director  | Burnet Institute |
| Shahidul Islam (Dr)      | Team leader   | Burnet Institute |
| Camilla Burkot           | Project Officer – Health Information and Quality Improvement                  | Burnet Institute |
| Geoff Chan               | International Health and Development Specialist                               | Burnet Institute |
| Manish Joshi             | Country Director  | Child Fund       |
| Olive Oa                 | Program Manager   | Child Fund       |
| Heather McLeod           | Country Director,   | World Vision     |
| Simon Peter Akena (Dr)   | Project Manager, Stop TB Western Province, World Vision                       | World Vision     |
| Sonia Madjus (Dr)        | TB Technical Advisor  | World Vision     |
| Wilfred Sikukula         | Chief of Party, TB/HIV & RSSH-GF, World Vision                                | World Vision     |
| Teresa Tamai             | Project Manager, NCD TB Project   | World Vision     |
| Harris Matthew           | Daru DARTS Sites Coordinator  | World Vision     |
| Helem Waenesori          | Community Project Supervisor  | World Vision     |
| Julie Heni               | CHW Bamu Dart Site ( Daru)  | World Vision     |
| Lucy Dai                 | Councillor Bamu DART Site ( Daru )  | World Vision     |
| Kemooly Tauwaigu         | Treatment Supporter Supervisor, Five Mile outreach Site NCD                   | World Vision     |
| Vero Galmai              | Treatment Supporter, Five Mile Outreach Site, NCD                             | World Vision     |

| <b>Name (title)</b>  | <b>Position</b>  | <b>Organisation</b>                                    |
|----------------------|--|--|
| Anna Jimmy           | Treatment Supporter, Five Mile Outreach Site, NCD              | World Vision   |
| Kara James           | Treatment Supporter, Five Mile Outreach Site, NCD              | World Vision   |
| Elsie John           | Treatment Supporter, Five Mile Outreach Site, NCD              | World Vision   |
| Susan Gada           | Treatment Supporter, Six Mile Clinic /BMU, NCD                 | World Vision   |
| Peter Goro           | Treatment Supporter, Six Mile Clinic, NCD                      | World Vision   |
| Joyce Agua           | Treatment Supporter, Six Mile Clinic, NCD                      | World Vision   |
| Ignatius Mogaba (Dr) | Deputy Country Director  | FHI360   |
| Susan Murithi (Dr)   | Senior Technical Advisor- Community Based TB Treatment Project | FHI360   |
| Prabesh Aryal        | Finance and Administrative Manager                             | FHI360   |
| Fredah Paul          | Five Mile Outreach Site, NCD                                   | Patient  |
| Naomi Ben            | Five Mile Outreach Site, NCD                                   | Patient  |
| Ann Clarke (Dr PhD)  | Project Manager  | B4H:TB & HIV   |
| Graeme Carswell      | Director   | Health and HIV Implementation Service Provider (HHISP) |
| Ruth Nicholls        | Health Coordinator   | HHISP  |
| Gaius Sabumei        | Project Manager/M&E, Child TB Project                          | HHISP  |
| Enamul Karim (Dr)*   | Technical Advisor to the Deputy Secretary of Health, NDoH      | HHISP  |
| Jeremy Syme          | Health Management Advisor, Western Province                    | HHISP  |
| Paul Quinlan         | Former Health Management Advisor, Western Province             | HHISP  |
| Emmanuel Kulu        | Patient Representative   | Daru   |
| Jeffery Ilai         | Patient Representative   | Daru   |
| Timothy Danaya       | Patient Representative   | Daru   |
| Ken Moke             | Patient Representative   | Daru   |
| Gabriel Kama         | Patient Representative   | Daru   |

And we had conversations with many other staff and patients on our field visits in NCD and Daru and thank all those who gave so generously of the time, their experience and their views

\* Contacted but unable to be consulted.

## ANNEX 4: SELECTED BACKGROUND DOCUMENTS

**MORE THAN 240 DOCUMENTS WERE ACCESSED BY THE REVIEW TEAM. BELOW IS A SELECTION OF KEY DOCUMENTS.**

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 1.1 Grant Proposal; RID-TB Reducing the Impact of Drug-Resistant TB in Western Province, PNG (2014-2015)


 1.2 Completion Report - Phase I; Reducing the Impact of Drug-Resistant TB in Western Province, PNG (Aug14-Nov15)


 1.3 Activity Proposal and Budget; Reducing the Impact of Drug-Resistant TB in Western Province, PNG (1Dec15-Nov17)


 1.4 Grant Partner reporting; Reducing the Impact of Drug-Resistant TB in Western Province, PNG (Phase IIa)\_1Dec15-31Dec16



 1.5 Grant Partner reporting; RID-TB Reducing the Impact of Drug-Resistant TB in Western Province, PNG (1Jan-31Dec17)



 1.6 Part 1 Burnet - RID TB Phase IIA Activity Proposal plan 2017-2018 Pages 1-30


 1.6 Part 2- Burnet Proposed Activity Plan - Key Burnet activities Jul17-Jun18



 1.6 Part 3 - Burnet Institute - RID-TB Budget 2017-2018



 1.6 Part 4 - Burnet 2017 Summary of plan



  2012 Tackling TB in WP

  20180531-2 rGLC brief



  Australian Department of Foreign Affairs~Organization (WHO) PartnershipC...



  DFAT TB Program Review - DFAT Listing -AAP & Annual Reports



  EMRS Harware request



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

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
  OR\_Topics\_Participants\_Facilitators



 2.  Papua-New-Guinea-Emergency-Tuberculosis-Project-PAD-05192017



 2.  PNG OR Course Brief 2017



 2.  Press Release of 6 December 2012 of Mini~ommitment of \$20 million for ... (1)



 2.  Press Release of 6 December 2012 of Mini~ommitment of \$20 million for ...



  7.1 Activity Plan - AAPConcept Note - Child TB Project 1 - 01st July 2016 to 30th June 2017



  7.2 Annual Report Child TB Project - 01 August 2016 to 30th June 2017 TB Project Extension Report



  7.3 Activity Plan 01st July 2017 to 30th June 2018 as well as Annual Report CHILD TB PROJECT 01st July 2016 to 30th June 2017

  7.4 Activity Budget - No Activity Plan as it is a continuation from June 2018- Child TB Meeting Notes 20\_July\_18

  7.5 CHILD TB PROJECT 2016 2018 CONCEPT Note - Concept Note 2016 to August 2018

  01\_PNG\_TB\_review\_2014

  1.1 Grant Proposal; RID-TB Reducing the Impact of Drug-Resistant TB in Western Province, PNG (2014-2015)

  1.2 Completion Report - Phase I; Reducing the Impact of Drug-Resistant TB in Western Province, PNG (Aug14-Nov15)

## ANNEX 5: DFAT TB INVESTMENTS IN PNG

### National level

- Funding a technical advisor to the central public health laboratory to build capacity and to support the development of an integrated disease surveillance and response system.
- Funding relevant laboratory commodities (autoclave, Gen-Xpert Modules etc.) and key lab related training to improve in country testing;
- Working in partnership with the Government of PNG (GOPNG) and all stakeholders in management and oversight role for the emergency response
- Amongst a suite of support under the WHO partnership, Australia funds an international MDR-TB specialist to provide technical support and advice to the National Department of Health, and TB partners and the emergency response
- Public Health and Health Services Management Advisor to support the NDoH
- Requests from NDOH for procurement, logistics, short term HR are facilitated through HHISP

### Western Province

- World Vision – grant to support community treatment sites on Daru Island and outreach and awareness in Middle and North Fly districts
- Burnet Institute - grant to provide technical support to Daru General Hospital (DGH) team to manage MDR TB
- Funding of health positions in Western Province Health Services, including Health Management Adviser for WP, two internationally recruited TB medical officers, and a third officer whose mobilisation is supported by WHO and 22 local positions in clinical TB and coordination role (all HR support to Western Province managed through HHISP)
- Infrastructure support: DGH infrastructure upgrade and Mabaduan Health Centre redevelopment

### NCD

- World Vision (Moresby North East) – they have both clinical and community work and their main referral basic management unit (BMU) is Six Mile Clinic
- FHI 360 (Moresby South) – Same as World vision. Lawes Road Clinic is their referral BMU
- Child Fund in partnership with MSF (Moresby North West) – note MSF is self-funded and it provides technical/clinical support in this electorate. Gerehu Hospital is their BMU

These three NGOs commenced 2017. Funding is AUD 3million 17/18 FY (\$1mill per NGO). Objective is to strengthen local TB response in NCD through community-based approach to improve treatment adherence among DS/MDR-TB patients – bringing treatment closer to where they (patients) live.

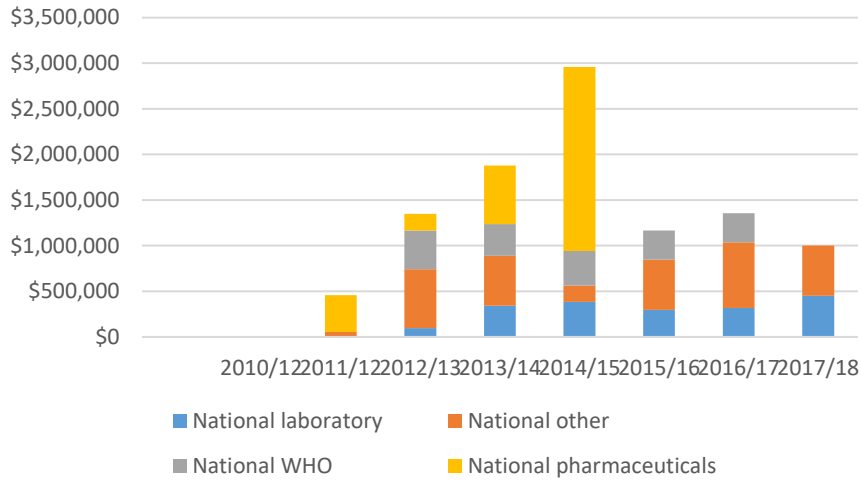
- Child TB – Support provided to PNG Paediatric Society to pilot new child friendly TB medication (develop guidelines and SOPs) at the Port Moresby General Hospital.
- Business for Health (B4H) Project. Main objective of this project: Increase workers' access to TB education, treatment, and prevention services through workplace TB programs. DFAT is supporting the Project Director up to June 2018.

### The World Bank

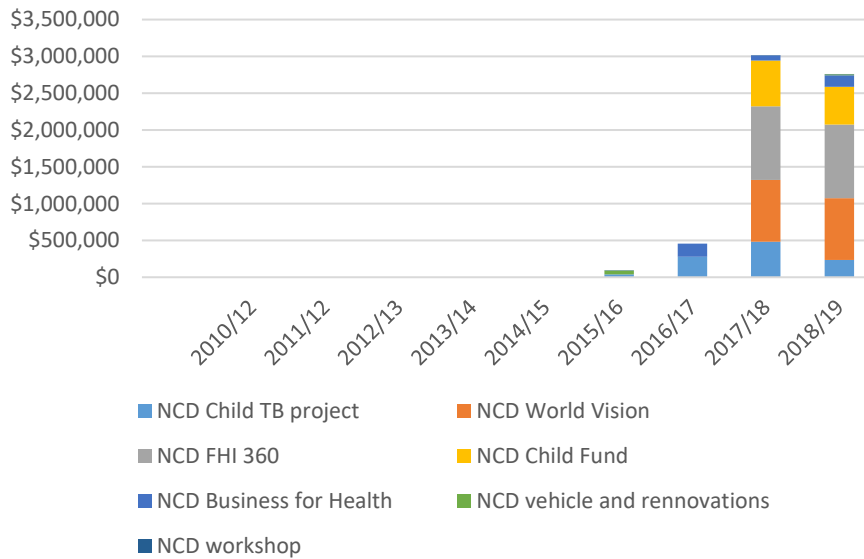
The World Bank is providing a loan of US\$15 million to address MDR TB in Western Province and the NCD. The USD15 million World Bank loan for the emergency TB response in PNG will be strengthened by an additional Australian co-financing up to USD6 million (or approximately AUD8 million) allocated against an annual work plan agreed by NDOH and the WB PMU in Port Moresby.

The source of all Figures below is DFAT, December 2018.

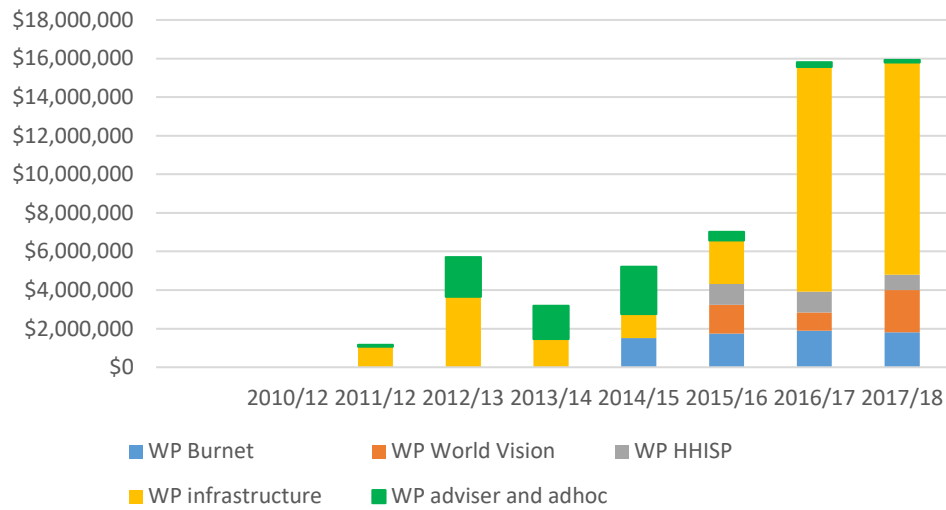
## 1. DFAT investments National level PNG



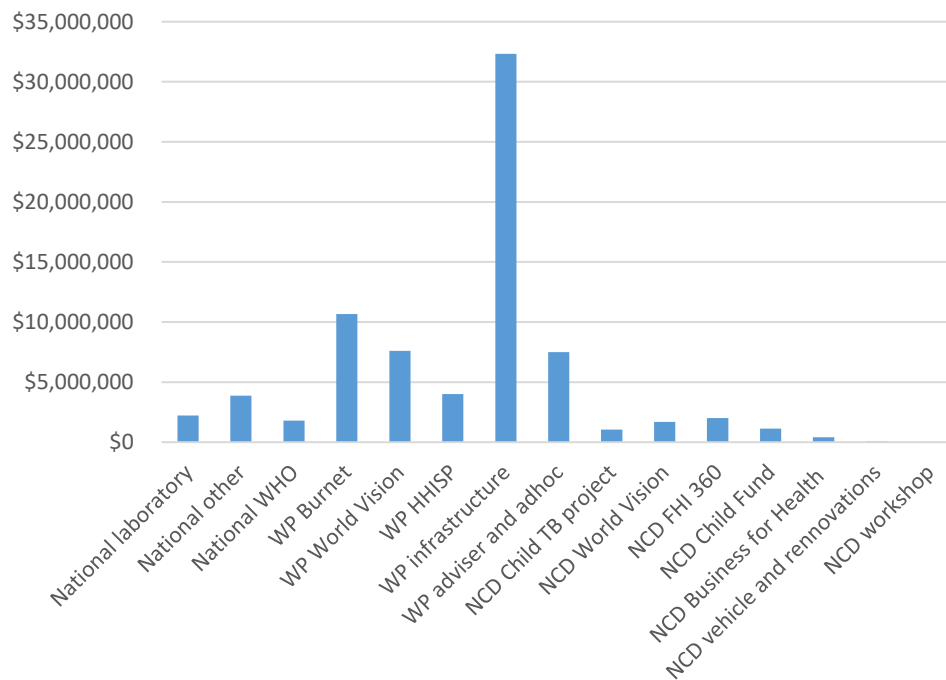
## 2. DFAT investments in NCD

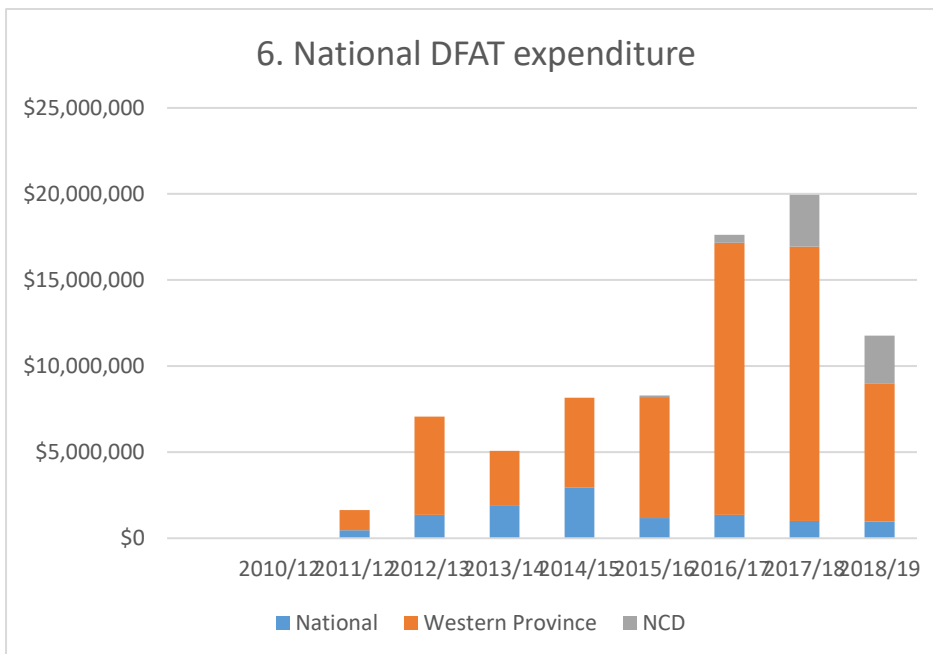
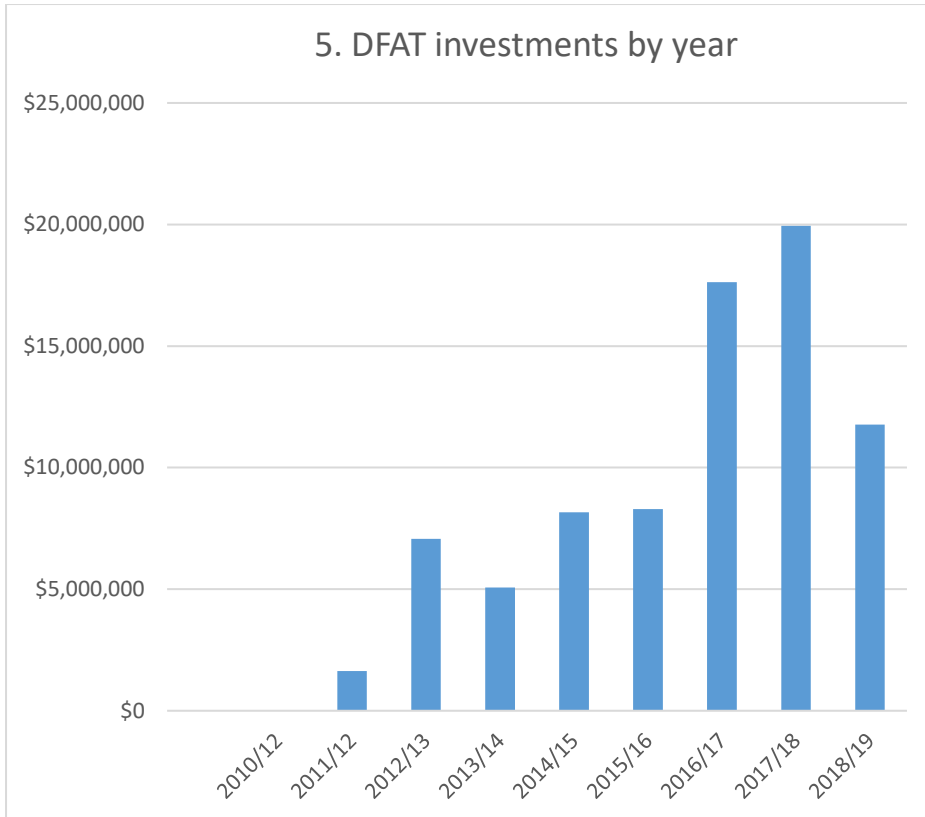


### 3. DFAT investment in Daru



### 4. Total DFAT investments 2010-2018/19





## ANNEX 6: GENDER AND SOCIAL INCLUSION

### Introduction

This gender and social inclusion analysis is an annex to the report of the independent review of the investments of the Australian government (GOA) in TB in PNG since 2011. It provides deeper analysis than space permits in the report.

### Overview

Women and children are key users of the health care sector; however, in general, women are far more disadvantaged than men in terms of accessing health services. Gender inequality and gender-based violence (GBV) are serious issues in Papua New Guinea (PNG). They have a major impact on the health of women and girls, their need for health services and their health seeking behaviour. GBV also has an impact on health system planning and the roles of women health workers. Gender inequality is seen in education, in health, in employment and access to economic opportunities, in legal and justice domains and in politics. In recent years there have been a number of country gender assessments and reports produced, but a striking feature of them is the dearth of disaggregated data to enable a clearer, evidence-based understanding of the inequalities in health status and access to and utilisation of health care between women and men, girls and boys.<sup>37</sup>

Access to better health is made worse by some underlying social determinants such as, low rates of education and literacy, poverty, low status of women in society, and violence against women which contributes to poor sexual and reproductive health. Other factors include, no or limited access to transportation to health care facilities, costs, remoteness, and stigma. Women are more vulnerable to communicable diseases such as HIV compared to men and boys.

The epidemiology and burden of TB in Daru shows that there is a roughly equal male to female distribution of drug resistant TB and drug sensitivity TB (Table 1).

**Table 1: Active MDR-TB and DS-TB Patients by Sex Distribution (May 2018)**

|                           | MDR-TB<br>(n=155) | DS-TB<br>(n=262) |
|---------------------------|-------------------|------------------|
| Male                      | 44% (68)          | 51% (133)        |
| Female                    | 56% (87)          | 49% (129)        |
| Average age at initiation | 28.2 years        | 26.9 years       |

Source: Daru BMU brief South Fly District, Western Province, PNG Regional Green Light Committee Mission, June 2018.

Patients treated for TB at the Daru BMU shows almost an equal number of males and females with slightly more males in the recent years (2016-2017) as shown in Table 2. This is consistent with data for PNG as a whole – with the average ratio of notified male to female TB cases in PNG from 2010 to 2015 being 1.07 (range 1.01-1.15) and remaining stable.<sup>38</sup> The same has been shown for NCD where

<sup>37</sup> DFAT 2018 PNG health Portfolio Plan (HPP)

<sup>38</sup> Aia P, Kal M, Lavu E, John LN, Johnson K, Coulter C, et al. (2016) The Burden of Drug-Resistant Tuberculosis in Papua New Guinea: Results of a Large Population-Based Survey. PLoS ONE 11(3): e0149806. doi:10.1371/journal.pone.0149806

sex distribution of new smear positive TB cases in PNG 2008–2012 showed an almost equal number of males and females for NCD.

The observed male to female ratios of TB patients in PNG generally and Daru and NCD specifically is significantly lower than the global average in low-income countries of 2 male cases for every 1 female TB cases.<sup>39</sup> The reasons for this are uncertain.

A possible reason for the equal sex distribution of TB patients in both Daru and NCD could be due to cultural factors such as male gender norms regarding health and masculinity where health seeking practices and caring for the sick is considered a female’s responsibility. Women are expected to look after the children and reduce infection and make sure all family members take their treatments. Only a few men would share this responsibility. This poses the question: are the right people being trained? Should more males be trained in TB prevention through community awareness and advocacy?

Many consulted in NCD and WP spoke of their efforts to reach out to women specifically through education and engagement with TB treatment. Part of this is the DOTS model making it easier for women, and those most vulnerable, to access case with the back-up of treatment supporters who go to them if they don’t present for treatment. A behavioural study is planned for WP to further understand TB health seeking behaviours of men and women and this should be done similarly in NCD, and investments in analyses to understand whether the demographic profile of those diagnosed with TB matches the profile of those infected with TB.

**Table 2: Male and Female Patients Treated for TB at Daru Basic Management Unit from 2015–2017**

| Sex        | 2015        | 2016        | 2017        |
|------------|-------------|-------------|-------------|
| Male       | 277 (49.4%) | 251 (52.8%) | 265 (52.5%) |
| Female     | 283 (50.4%) | 224 (47.2%) | 240 (47.5%) |
| Unrecorded | 1 (0.2%)    | 0 (0.0%)    | 0 (0.0%)    |

Source: Morris, L. et al. 2018. (In Press.) *The emergency response to multidrug-resistant tuberculosis in Daru, Western Province, Papua New Guinea, 2014-2017*. Manuscript submitted to *Public Health Action: Health Solutions for the Poor*.

## Findings

The findings of this review on gender and social inclusion as part of the independent review of DFAT investments in TB in PNG are below, presented against selected criteria of the DFAT M&E framework: relevance, effectiveness, impact and sustainability.

### 1. Relevance

The review found that the DFAT TB-related investment in gender and social inclusion is appropriate. TB is prevalent and widespread affecting all sectors of the population in the Western Province (WP) and the National Capital Territory (NCD). The Multi-Accelerated Response (MAD) facilitated by World Vision (WV) in WP has incorporated interventions for and with the all surrounding communities on Daru Island. The community advocacy and awareness provided through the DFAT-funded activities of World Vision<sup>40</sup> and the Burnet Institute<sup>41</sup> and the DFAT-funded Health and HIV Implementation

<sup>39</sup> Horton KC, MacPherson P, Houben RMGJ, White RG, Corbett EL (2016) Sex Differences in Tuberculosis Burden and Notifications in Low- and Middle-Income Countries: A Systematic Review and Meta-analysis. *PLoS Med* 13(9): e1002119. doi:10.1371/journal.pmed.1002119

<sup>40</sup> World vision provides treatment, care and support to both MDR TB and DS TB patients.

<sup>41</sup> Burnet Institute provides counsellors at treatment sites



Provider RT/ADB (HHISP)<sup>42</sup>, which have expanded since 2014. Screening, treatment and care has included women and girls, children, in and out-of-school youth, prisoners, and people living with some form of disability in all five wards on Daru Island. According to World Vision's Daru M&E data, women, children, and young people between the ages of 12 and 25 years old, who have received and are receiving TB treatment, mostly reside in neighbouring informal settlements. The settlers have low socio-economic status and poverty, crime, gender-related violence, and poor nutrition are more commonly seen.

In Daru, although there is inclusion of all social groups within the community through a demographic and household census conducted for the Systematic Screening Initiative (SSI) project, screening is voluntary. There are discussions on this being mandatory in 2019 to increase uptake from the current 55-70% (the former figure is from DFAT and the latter was provided during the review consultations). There is now an almost equal number of female and male treatment support staff. This is a paid job and there is training and capacity building in other public health areas such as nutrition, hygiene and reproductive health (including HIV and AIDS). Some of the female staff were former TB patients and are now engaged as treatment support staff with WV and as counsellors with the Burnet institute.

The DFAT TB Investment in NCD has included all sectors of the community covering its three administrative districts - Moresby North East, Moresby North West, and Moresby South. There are fifteen TB Basic Management Units (BMU) spread across NCD that are accessible for women and vulnerable groups. Three community-based organisations<sup>43</sup> are providing DOTS treatment support, counselling, and case management and follow up of patients. These organisations have gender, child, and social inclusion policies and implement these policies in their respective TB interventions, thus addressing gender inequality, empowerment and gender-based violence (GBV).

Gender policies of TB program partners in both Daru and NCD promote an uptake of female employees and the non-discrimination of vulnerable groups such as those living with a disability, HIV and AIDS. The TB programs in both Daru and NCD collect sex disaggregated data and are consistently improving in this area. In NCD, monthly meetings attended by partners, review and share reports for program monitoring. This review confirms that data collected by all partners in Daru and NCD are sex disaggregated.

In Daru, children under 5 years old of TB infected parents are included in the management of TB prevention. A component of Burnett Institute's community outreach program screens and treats children living with TB infected parents using child-friendly services. The inclusion of children is an intervention through the RID TB Project; which engages and empowers TB affected communities through a pilot model of patient education and counselling (PEC). The PEC component consists of a team of trained peer-counsellors or "TB-PALS" (People Affected by, Living with, or having Survived TB). This team uses a patient-centred approach to provide psycho-emotional support, facilitate adherence to treatment and promote well-being. The model of care integrates community-based delivery systems for both drug-sensitive (DS-TB) and drug-resistant (MDR-TB) care and prevention Reducing the Impact of Drug-Resistant TB (RID-TB Project). The pilot model of PEC care focuses on MDR-TB due to the complexity (side effects, length) of this disease and increased impact of social and emotional issues for patients. The education and counselling services this project provides aims to reduce the impact of social and emotional issues on TB patients and their families, promote patient retention in care to enable cure from TB disease.

Furthermore, program objectives in Daru have addressed the inclusion of adolescents through the uptake and access to contraception which is offered through the counselling and education activities. There are specific challenges for pregnant women where TB drugs are toxic for unborn babies.

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<sup>42</sup> HHISP contracts various staff on behalf of GOPNG including those providing contact tracing and case management of hospital TB in-patients

<sup>43</sup> World Vision, Child Fund, and FHI360

Treatment protocols and advice have been taken into account to address reproductive health concerns for pregnant women. The TB prevention program has addressed these needs and challenges which is a part of the management of TB prevention. This will ultimately contribute to a reduction in TB transmission, and therefore has been a relevant investment from DFAT.<sup>44</sup>

## 2. Effectiveness

Daru mostly provides services for the people of South Fly district and those that live on the northern banks of the Fly River delta. Trading in Daru is largely influenced by the compensation money paid by the Ok Tedi Mine. Other sources of income are fish and local vegetables sold at the local market. Income per capita of people in the district is very low. The majority of the population live in poverty.<sup>45</sup>

TB treatment and care has been literally provided at the door steps of the poorest and vulnerable. For instance, contact tracing, case management and follow up of patients for TB treatment is taken right to the houses of children, those with disability, and boarding students at Daru Secondary School. Thus, DFAT's investment has been beneficial to those who need it the most.

In 2017, the Burnet Institute (Burnet) integrated cross-cutting issues of gender, disability, child protection and equity into its TB prevention approach in Daru by assisting the Western Province TB program to disaggregate and analyse all programmatic data by sex and age; development of protocol for socio-behavioural research with the inclusion of significant gender-related components, targeted at gaining a deeper understanding of how best to address gender-related barriers to effective hospital and community-based treatment. However, this operational research remains part of the funding gap for the accelerated response.<sup>46</sup>

Callan disability services in Daru – a disability focused NGO operating in Western Province - is now assisting DGH with testing and monitoring of hearing loss of patients, who have experienced impaired hearing as a result of their TB medication. The project has positively impacted several vulnerable populations, which have been identified for targeted strategies within the TB model of care, including HIV positive, rural/remote, and cross-border populations. Burnet's child protection policy and compliance guidelines standards are incorporated into all its programs.<sup>47</sup>

Psychosocial support for patients and their families reduces the barriers patients face in continued access to TB services for the duration of treatment. Burnet identified that provision of effective psychosocial support was a gap in the patient-centred model of care in Daru. In the second half of 2016 Burnet allocated funding through the DFAT ANCP mechanism to implement a patient education and counselling (PEC) program integrated into the existing model of care. The program focussed on supporting patients to complete treatment and reducing the impact of TB treatment on them and their families. The program model maximises the use of local resources by recruiting and training former patients and people affected by TB to work as peer counsellors. Burnet has recruited a team leader and five peer-counsellors, has developed patient education and counselling guidelines and has trained the counselling team on provision of psychosocial support (including a gender focus)<sup>48</sup>.

The TB intervention in Daru, through its community programs is part of a referral pathway for individuals<sup>49</sup> who experience GBV. Victims of GBV are referred to the sexual violence unit of the

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<sup>44</sup> Burnet Institute, Reducing the impact of Drug-Resistant Tuberculosis in Western Province, PNG (Phase IIa). Grant partner reporting. 1 December 2015– 31 December 2016 (13 month period).

<sup>45</sup> Provincial Strategic Plan for Tuberculosis in Western Province; 2016-2018

<sup>46</sup> Burnet Institute, Reducing the Impact of Drug-Resistant Tuberculosis in Western Province, Papua New Guinea. August 2014 to November 2015. Grant partner reporting template, Completion Report – Phase 1.

<sup>47</sup> Rid-TB: Phase IIA. Reducing the impact of drug-resistant tuberculosis in Western Province, Papua New Guinea. July 2017 - June 2018.

<sup>48</sup> Burnet Institute, Reducing the impact of Drug-Resistant Tuberculosis in Western Province, PNG (Phase IIa). Grant partner reporting. 1 December 2015– 31 December 2016 (13 month period).

<sup>49</sup> GBV is faced by both men and women, but mostly females.

Western Province Police Department who work with GESI (Gender and Social Inclusion) volunteers to arrest perpetrators of GBV. A safe house also funded by DFAT (not part of TB program) was built within the hospital compound to temporarily accommodate victims of GBV and other forms of sexual violence. One of the review teams visited the safe house and spoke to the GESI staff. Most cases of gender-based and sexual violence in Daru are caused by alcohol and drug abuse, one of the main social problems faced in Daru. According to the GESI staff and several other individuals interviewed, the excessive abuse of processed and homebrewed alcohol (*tuba*), and marijuana is a concern as women and children are mostly vulnerable to gender-based and sexual violence and child abuse. Alcohol and drug abuse remain a challenge as a root cause to all forms of violence on Daru Island.

In Daru, the review found that on a few occasions, long periods of time spent in the hospital for treatment, brought on suspicion by husbands that while their wives were in Daru Hospital for TB treatment, they were involved in extra-marital affairs with other men. This caused arguments and violence resulting in women leaving the hospital, even when they were in health facilities to take care of their sick children.<sup>50</sup> Some male partners and husbands of female treatment supporters would get drunk at times and hit their wives for spending too much time doing TB work and not attending to their homely duties’.

In NCD, GBV is linked to the stigma of TB. Women and adolescents are mostly vulnerable to violence as they are accused of bringing the disease into the household. They are sometimes chased out to live somewhere else. In many urban homes in PNG (Daru and NCD are urban), home owners and lease holders, accommodate extended relatives and homeless friends. Females and youths are mainly stigmatised for having TB and/or AIDS, but the homeless are also vulnerable. A TB diagnosis can lead home owners to force the person diagnosed with TB to leave the house as they are accused of contributing less financially. The stigma of a TB diagnosis effects health seeking behaviour especially in NCD where TB cases are often reported in their very late stages when the person has become bed-ridden and too weak to move around.<sup>51</sup> Often people showing signs and symptoms of TB, are afraid to take a TB test due to stigma, rejection and violence. In the absence of a behavioural study, the frequency and magnitude of GBV and how it affects TB prevention is unknown at this stage; however, examples of such stories reflect the need to strengthen the advocacy for GBV as it is still a social barrier in the prevention of tuberculosis. In NCD, NGO partners like World Vision have gender education and training programs to facilitate GBV in TB interventions. However, more needs to be done in order to understand the dynamics of GBV and its association to TB related issues such as; conducting an ad hoc survey or qualitative study. GBV is a sensitive matter and bears ethical implications; thus, it requires studies that have ethical approval. The findings of such studies will better inform DFAT in effectively addressing GBV in the management of TB infection.

In NCD, NGO partners like World Vision have gender education and training programs to facilitate GBV in TB interventions. On the other hand, more needs to be done in order to understand the dynamics of GBV and its association to TB related issues such as an ad hoc survey or qualitative study as GBV is a sensitive matter and bears ethical implications.

The most obvious benefit achieved is the improvement in the general health of women, children and those most vulnerable. As women receive treatment and recover from TB, they are able to provide better care and support for their families including their husbands and male partners. DFAT’s investment into TB has also provided income earning opportunities; such as the direct employment of the local people. People are well again in order to return to their livelihood, producing and selling vegetables, and other products to earn income. Therefore, the benefits are for the long term supposing there is no relapse or re-infection.

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<sup>50</sup> Source: TB contact tracing staff, DGH.

<sup>51</sup> Stories told by current TB patients, World Vision Treatment Site, 5 Mile Ridge Camp, NCD. 12<sup>th</sup> Dec, 2018

There is better awareness of the disease and misconceptions have been minimised. Prior to 2011, sorcery was commonly blamed for TB infections. This review found that in Daru, after DFAT's investment in funding awareness and advocacy activities, most people relate any coughing to TB and seek medical treatment when they experience the signs and symptoms of TB. Sorcery and other traditional beliefs as the causes of TB are less heard of. Nevertheless, there were conflicting responses when the issue of stigma was raised indicating that stigma could be an issue to focus on in community awareness on TB.

In NCD, community treatment, care and support of TB patients by World Vision, FHI360 in partnership with Salvation Army, and Child Fund in partnership with MSF, have been in operation for less than two years and are yet to assess the full benefits of their programs. In the last year, most activities were in strengthening staff capacity and operational components.<sup>52</sup> Cross-cutting issues being addressed<sup>53</sup> including strengthening capacity for female treatment supporters, increasing community awareness on the risks of delayed health seeking behaviours, the inclusion of ethnic minority groups who mostly live in settlements and the inclusion of people living with some form of disability<sup>54</sup>.

HIV and AIDS cannot be separated from TB due to their epidemiological association, thus although this annex of the review focusses on TB, DFAT's investment has been effective in addressing HIV and AIDS treatment and care for both male and female patients diagnosed with TB and AIDS.

### 3. Impact

There are gender policies for all DFAT funded partners in Daru and in NCD there is an increase in female participation in TB control activities as reported in 2017 quarterly reports and activity plans such as an increased number of females in TB training. For instance, the B4H report July 2016 to Dec 2017 stated that, 'women lead few private sector companies; and no female led businesses requested for TB executive briefings. However, all male CEOs and Managing Directors included female staff in TB executive briefings. Companies are encouraged to send equal number of females and males to workplace TB training. To that end, B4H has achieved high participation rates by female employees. Of the 72 TB workplace trainees, 47 (65%) have been female'.<sup>55</sup>

Women are taking leading roles in the control of TB. There is continuity of work commitment by female staff in the treatment support for patients, some going back 10 years notwithstanding static wages. According to three female treatment supporters interviewed at DART sites in Daru, they are committed because TB affects their families and relatives. Women play leading roles in bringing relatives forward for screening and treatment, they take them home and care for them. The same was reported by female treatment supporters at DOT sites in NCD.

One of the gaps has been in understanding the leadership roles of men in their families and community, and how they can contribute to the prevention and treatment of TB. This includes cultural norms and gender roles and responsibilities involving health seeking behaviours, impact on livelihoods and vulnerability to TB infection. For example, Daru is well short of reaching 100% screening of all long-term residents of the island, thus there are barriers to voluntary screening that are yet to be known. As men are mostly heads of households, it would be interesting to find out if gender power dynamics are at play when it comes to decision-making for health seeking behaviours for TB, including all other diseases and health issues (public health). Male leadership may not always oppose female empowerment; however, it could be a complimentary approach in the fight against TB. The idea is to

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<sup>52</sup> World Vision, sustaining the gains of the NCD North East Accelerated Response. Annexure 2: Schedule 3A-Updated work plan and budget (period 1<sup>st</sup> July 2018-31<sup>st</sup> March 2019)

<sup>53</sup> Cross-cutting Issues: gender, disability, child protection and equity

<sup>54</sup> ChildFund PNG. Grant Partner Report Template (Annual Report), July-December 2017

<sup>55</sup> World Vision, Business for Health (Tuberculosis), Grant partner reporting template, July 2016-Dec 2017

empower both males and females in understanding and decreasing the spread of TB together as a family unit.

#### **4. Sustainability**

The Western Province like many parts of PNG is a patrilineal society where men are seen to have all the rights in decision making. For sustainability purposes, the program needs to involve more men in community advocacy. It will not help much if women are involved then return home where husbands are still ignorant of the implications of TB infection. More involvement of community male leaders, men and young boys in Western Province is recommended. Although NCD consists of different ethnic groups from across PNG, the country is predominantly patrilineal, and the same would be recommended for NCD.

Overall, program activities are addressing the gender goals, but program staff and volunteers need to be more consistently clear that gender and social inclusion is a DFAT priority. As found in this review, the priority of the implementing partner organisations is the treatment, prevention and care of TB. Both male and female staff, at all levels of partner agencies need to be clearly informed about the implications of gender and social inclusion on the TB program and ending the TB epidemic. Strategies on gender and social inclusion, while now in place and in effect mainstreamed, seem to be seen by some as either a lesser priority or are overshadowed by the dominant activities of treatment and care. In PNG, a driver of the TB epidemic is social and cultural determinants of health and wellbeing including gender inequality and GBV. Understanding this and developing and strongly implementing gender and social inclusion strategies is an important contribution to ending the epidemic.

## **ANNEX 7: ECONOMIC ANALYSIS: RETURN ON INVESTMENT DFAT FUNDING IN DARU**

### **Introduction**

A simple return on investment ROI economic analysis was conducted as part of the review process to estimate the value of DFAT TB investments in Daru. A ROI analysis compares the financial costs of running a program or intervention to the economic benefits that result from that program.

### **Methods, data sources and assumptions**

This ROI includes the cost of the DFAT in Daru from 2014 to 2018. The economic benefits that are included are: the infections that are saved because of successfully treated MDR-TB and DS-TB, the associated drug treatment costs of those infections that are saved, productivity impacts for infections saved based on time that would have been spent on treatment, and productivity associated with lives saved through successful treatment. The costs not included in this analysis are the value of human life, health care costs other than pharmaceuticals, costs to carers, disability impacts and an ongoing dynamic capture of infection. The treatment success rates available in NCD and the rest of WP are premature not allowing for replication of a comparable analysis outside of Daru. Analysis is based on best available data provided to the review team and best possible assumptions.

The costs included in the investment are the DFAT funding attributable to TB in Daru. These figures were provided directly by DFAT and HHISP (December 2018). Investment costs were assumed to include 50% of the WP Health Management Advisor role, 95% of World Vision – grant to support community treatment sites on Daru Island and outreach and awareness in Middle and North Fly districts, 95% of HHISP positions funded in WP, 1/23rd of the Public Health and Health Services Management Advisor to support the NDoH and 10% of the CPHL costs (technical advisor role). DFAT funded infrastructure is assumed to have a 40-year life and only to be included in the analysis as an amortised cost per year for the years currently under consideration between 2010/11 and 2017/18. Each year is a financial year, for example 2018 represents 2018/2019. The 2018 funding estimates also include 6 months of projected costs which were provided from HHISP only. The total costs of the DFAT investment for Daru were estimated as \$27,124,273 total from 2014 to 2018, based on figures provided to the review team.

The number of cases (See Table 5, BMU Annual Case Notification Rates above) was multiplied by the treatment success rates (synthesised from Morris et al, 2019, NTP data and Figure 4 and 5 above) to obtain the number of cases successfully treated. Cases successfully treated were assumed to lead to saved downstream infections. A transmission/infection rate of 10% was used combined with the average contacts per index case of 25 to provide the number of infections avoided. The mean latency period was assumed to be 3 years.<sup>56</sup> These infections are undiscounted and the subsequent infections 2nd generation are not included as it would require more sophisticated dynamic modelling to estimate which was beyond the scope of this review. The saved infections were then used to calculate a saved treatment cost and savings in productivity lost through time on treatment.

Treatment costs were assumed to be AUD\$53.60 per person for DS-TB and \$7,656 per person for MDR-TB (see previous DFAT costing for World Bank loan). The number of saved infections was multiplied by the treatment cost per person to generate an estimate of saved treatment costs. Patients with DS-TB are assumed to lose 2 months of productivity while in the active phase of treatment while MDR-TB patients are assumed to lose 12 months of productivity due to intensive

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<sup>56</sup> Trauer et al, 2016; <https://www.cdc.gov/tb/publications/factsheets/general/LTBlandActiveTB.pdf>

treatment requirements plus the impact of side effects. Productivity is valued as the average Gross Domestic Product of PNG of \$US2,402 (<https://www.statista.com/statistics/731709/gross-domestic-product-gdp-per-capita-in-papua-new-guinea/>). Productivity savings associated with saved infections was calculated as the number of saved infections multiplied by the time impacted (converted to a % of one year, as indicated above) multiplied by average GDP.

Once a person contracts TB the mortality impact from DS-TB or MDR-TB is assumed to be 16.1% (<https://www.tbfacts.org/tb-statistics/>). The number of persons successfully treated for MDR-TB and DS-TB is multiplied by 16.1% to estimate the number of deaths assumed to be avoided because of successful treatment. The life years lost over the life course is estimated assuming that the average age of contracting TB is 25 years a mean latency period of 2 years and an average life expectancy of 61.5 years (Trauer et al, 2016).

## Results

### Results

The analyses estimate a total of 1037 MDR-TB and 4339 DS-TB saved infections, AUD8.2m of saved pharmaceutical costs, and an additional 1760 years of productivity over life course (associated with saved deaths through successful treatment and time avoided on treatment for infections saved). Estimates generated a lowered mortality risk (255 undiscounted deaths averted). The estimates cost per life year gained is AUD3,089. The total DFAT investments over the period in Daru were AUD27.1m with a preliminary return on each dollar of investment estimate of AUD2.30.

### Interpretation

A return on investment (ROI) result can be simply interpreted as being a good investment if the amount is positive. i.e. the investment yields more benefit than it costs. This is the case for the DFAT investment which yields \$2.30 in benefit for each \$1 of investment. There are few ROI estimates to compare with in the international literature and care needs to be taken when making comparisons to ensure methodologies are consistent.

The United Nations (UN, 2013) report cited that for each \$1 spent on TB a \$30 return was expected due to improved health and productivity, making TB one of the most cost-effective conditions for investment. The figure of \$30 is based on a report by Jamison et al (2008) that provides few details or parameter inputs to aid a comparison with our figures. However, Jamison et al (2008) use a disability adjusted life year (DALY) methods which includes not just the value of premature mortality but also the value of life adjusted for the severity of disability caused by the disease (in this case tuberculosis) and an assumption that life itself is worth 50 times gross domestic product (GDP) (Jamison et al, 2008). Our estimates focus on treatment costs, mortality and productivity measured using gross domestic product (GDP) which is a standard, simple but conservative cost-benefit approach (McIntosh, 2010). The incorporation of disability impacts and valuing life beyond direct productivity were considered beyond the scope of the current evaluation. In Daru many people are not employed meaning that valuing their productivity as average PNG GDP is perhaps overstated, with 50 times GDP likely to be an overestimate. The impact on disease transmission into Australia or other countries was likewise not included.

It is therefore not a fair comparison to directly compare the \$2.30 return for the DFAT investments to the \$30 in the UN report. A simpler interpretation is that a positive return on investment is desirable and a positive outcome. Judgements about the relative size of the return relative to other worldwide TB programs is beyond the reach of the simple estimates generated for this review and would require a thorough examination of methodologies.

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## ANNEX 8: RETURN ON INVESTMENT: GENEXPERT MACHINES

### Introduction

A simple return on investment ROI economic analysis was conducted as part of the review process to estimate the potential value of investments in GeneXpert Machines.<sup>57</sup> A ROI analysis compares the financial costs of an investment to the economic benefits that result from that investment.

### Methods and Results

#### National Capital District

Currently approximately 6000 suspected TB patients present to the PMGH each year (according to estimates provided to us directly by PMGH). Assuming 10% of these are hospitalised at a cost per day of \$1492, a two week delay in receiving GeneXpert testing results leads to an opportunity cost to the hospital for these bed days of AUD12.5m each year. In addition, while delayed and waiting for confirmed results 170 additional infections are forecast per year with an associated undiscounted treatment cost of AUD138,550. To purchase two additional GeneXpert machines plus reagents to reduce testing time to 24 hours would cost AUD118,736. The preliminary return on investment for each dollar spent on new testing machines is AUD107.

#### Daru

In Daru there are approximately 33 GeneXpert tests run per week (1743 per year). Assuming 5% of these are inpatients at a cost per day of AUD1492, a 2 day delay in receiving GeneXpert results leads to an opportunity cost to the hospital for these bed days of AUD258,713 per year and an additional 25 infections made while patients are waiting for results. In Daru approximately 26% of these are MDR-TB with the remaining 74% DS-TB meaning an associated treatment cost of AUD49,784. The total cost of the 2 day delay (inpatient cost of waiting for result, plus new infections while waiting) is estimated as \$308,497 per year. There do not appear to be any costs required to increase the speed of results from 3 days to 2-3 hours with current machinery and staffing levels considered appropriate .

### Data sources and assumptions

AUD\$16,000 per GeneXpert machine, assumed to need 2 additional machines in PMGH (see previous DFAT costing for World Bank loan)

USD\$9.98 per cartridge (\$AUD13.90) associated with 2 new 4 module GeneXpert machines running 3 times per day in PMGH (<https://www.tbfacts.org/genexpert/>)

Training and human resource costs are not included in the analysis

DGH: Number of GeneXpert tests conducted per year 1734 or 33 per week (Routine PMDT Report to NTP, data for Jan to June 2018 multiplied by 2 to reflect an annual period)

DGH: Of the 1734 tests conducted each year, 243 are DS-TB positive and 85 are MDR-TB positive- this is the number of patients who are at risk of spreading infection while they await results (TB program electronic medical records system (Bahmni), provided by Burnet Feb 2019)

PMGH: Number of suspected TB patients presentive each year (500 per month, based on estimate provided by PMGH TB Program, Dec 2018)

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<sup>57</sup> GeneXpert tests diagnose TB and rifampicin resistant (RR) TB in 2 hours; sensitivity is imperfect in smear-negative and HIV-associated TB and Ultra GeneXpert testing is a second-generation test designed to overcome sensitivity limitations – it also gives results in 2 hours; its development was co-funded by GOA. Ultra will have special impact for children, HIV/TB co-infected patients and other difficult-to-diagnose groups by enabling rapid TB diagnosis.

PMGH: Of the 6000 suspected TB patients each year, 19% will be TB positive (based on proportion positive in Daru analysis, and 10% of these will have DR TB with the remainder DS TB, assumed based on clinical judgement)

Current length of additional time waiting for test results 14 days in PMHG and 3 days in DGH

Cost per patient per bed day AUD\$1492 (see previous DFAT costing for World Bank loan)

Proportion of tests at the hospital that are for hospitalised patients is 10% in PMGH and 5% in DGH due to a greater number of patients attending diagnostic facility as outpatients screened in community in Daru (assumption)

Infection risk 10%,

(<https://www.cdc.gov/tb/publications/factsheets/general/LTBlandActiveTB.pdf>) Number of contacts per patient 15 (assumption based on a minimum ward size and hospital waiting area sizes)

Treatment costs were assumed to be AUD\$53.60 per person or DS-TB and \$7,656 per person for MDR-TB (see previous DFAT costing for World Bank loan)

## ANNEX 9: RETURN ON INVESTMENT: LINE PROBE ASSAY (LPA) MACHINE

### Introduction

A simple return on investment ROI economic analysis was conducted as part of the review process to estimate the potential value of investments in Line Probe Assay machines.<sup>58</sup> A ROI analysis compares the financial costs of an investment to the economic benefits that result from that investment.

### Methods and Results

The following analyses demonstrate the return on investment of adding an automatic LPA machine to the CPHL in PNG. Currently suspected MDR-TB samples are sent offshore to Queensland Health for testing leading to an additional 14 day turn around on obtaining test results. The costs of sending the samples to Queensland is estimated as AUD62,400 per year in addition to the AUD39,550 spent on Queensland Health laboratory processing fees. This equates to a total cost of AUD101,950. Investing in an automatic LPA machine would cost AUD25,240 plus annual CPHL costs of consumables of AUD7000; leading to an immediate saving of AUD69,710. In addition to the immediate savings, the benefit of having the LPA test available in PNG include having MDR results available 14 days earlier than is currently the case. This means that in outer areas like Daru some patients are started on longer regime treatments when a shorter regime treatment would have been suitable. However, after delays of up to a month from Daru to CPHL to Queensland and back, patients are often established and stable on a longer regime before this information becomes available with clinicians reluctant to then switch treatment regimens. The cost of MDR-TB longer regime is AUD7656 compared to the short regimen at AUD1392. We consider a scenario in which approximately 25% of patients in Daru could be eligible for appropriate substitution with shorter regime treatment if the test results were available 14 days earlier. This would equate based on 2017 cases (49 MDR-TB, 8 pre-XDR-TB and 4XDR-TB, Morris et al 2019) to treatment savings of AUD537,660 in just Daru alone. Additional benefits include the impact on disease resistance itself with important downstream impacts. Other benefits include at least a 50% reduction in treatment supporter resources required to treat a case of MDR-TB through a shorter treatment period.

### Data sources and assumptions

Costs of treating a patient with MDR-TB \$7,656, XDR-TB \$15,312 using longer regimens (see previous DFAT costing for World Bank loan)

Cost of treating a patient with MDR-TB, pre-XDR-TB or XDR-TB using shorter regimens \$1392 (<https://www.tbfacts.org/multi-drug-resistant-tb/>)

25% of patients started on longer regimens could be appropriately managed on shorter regimens if test results were available 14 days earlier (assumption)

350 cases per year require LPA testing (CPHL statistics for 2017)

Queensland health costs freight \$1200 per week, \$113 per sample tested with LPA (data provided directly by CPHL, Dec 2018)

Cost of automatic LPA machine 16,000 euros, cost of consumables and reagents for CPHL 48 kina per test

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<sup>58</sup> Line Probe Assay (LPA) laboratory tests are designed to identify TB and simultaneously detect mutations associated with drug resistance.

Length of time to ship to Queensland and obtain result back 14 days (data provided directly by CPHL, Dec 2018)

Length of time to process in PNG 7 days (data provided directly by CPHL, Dec 2018)

Training and human resource costs are not included in the analysis

Number of MDR-TB, pre-XDR-TB and XDR-TB cases taken from 2017 data (Morris et al, 2019 manuscript in press, includes data from the TB program electronic medical records system (Bahmni) provided to the National TB Program)