WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC

MISSION REPORT EXECUTIVE SUMMARY

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Papua New Guinea	23-30 November 2012
Place(s) visited	Dates of mission
MR/2012/0866	WPDCC1206752	5.3
Report series number	Project identifier	Activity code

Objectives of mission:

In collaboration with national authorities in Papua New Guinea:
(1) to assess implementation of the activities required for the proper detection and programmatic management of drug-resistant (PMDT) TB;
(2) to review and advise on the national plan for multidrug-resistant TB (MDR-TB) management; and
(3) to assess the effectiveness of all development partner contributions in assisting the national TB control programme (NTP) to strengthen TB/MDR-TB services in Papua New Guinea.

Summary of activities, findings, conclusions and recommendations:

A mission was conducted on 23-30 November 2012 to assess implementation of the activities required for the proper detection and programmatic management of drug-resistant TB. A team from the WHO Regional Office for the Western Pacific visited Daru of South Fly District of the Western Province, Lae of Morobe province and Port Moresby.
There is clear progress in TB prevention and control in South Fly. Health staff have been trained, transport and communication improved, health facilities are supervised and outreach activities are implemented. Facilities are better supplied with general drugs. Smear microscopy has been established in some health centres. Daru hospital has been equipped with a digital X-ray, a biochemistry machine and GeneXpert. Better diagnosis has led to an apparent increase in the number of patients notified with TB and MDR-TB. The use of fixed-drug combination (FDCs) has been expanded outside Daru Island. MDR-TB patients were promptly started on MDR treatment and have shown promising results so far. The number of deaths in MDR-TB patients has declined sharply and patients adhere to directly observed treatment (DOT). Infection control has been strengthened in Daru hospital where a new TB ward is under construction. Overall, confidence in public services has increased where health centres and aid posts have been equipped and medicines have been procured. Lastly, a project funded by the Australian Agency for International Development (AusAID) has begun closer coordination and collaboration with South Fly district health services. The major challenge identified during this mission is the fast-approaching potential disruption of critical functions in the TB control programme. These functions are mainly monitoring, supervision, procurement and supply chain management, currently assumed by Jane Thompson Association International (JTAI), a partner supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). Continuity of the NTP is in danger, as the Global Fund Round 6 is ending in March 2013, with no concrete plans to move services to the National Department of Health (NDOH).

Recommendations include the following:
(1) Develop a transition plan to prepare for the period after the GFATM and describes in detail how government services will cover essential components of NTP, including adequate staffing, supervision and monitoring at all levels.
(2) Consider undertaking a gap analysis for comprehensive budget planning to include programmatic management of drug-resistant tuberculosis (PMDT) operations.

Key words : Pacific Islands / Tuberculosis - epidemiology, prevention and control / Tuberculosis, Multi-drug resistant

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1. PURPOSE OF MISSION

A team from WHO Regional Office for the Western Pacific visited Daru of South Fly District of the Western Province, Lae of Morobe Province and Port Moresby, Papua New Guinea from 23 to 30 November 2012 with the following terms of reference:

In collaboration with national authorities:

(1) to assess implementation of the activities required for the proper detection and programmatic management of drug-resistant (PMDT) TB;
(2) to review the progress of implementation of the recommendations from the previous technical assistance mission on PMDT;
(3) to review and advise on the national plan for multidrug-resistant TB (MDR-TB) management;
(4) to assess the effectiveness of all development partner contributions in assisting the national TB control programme (NTP) to strengthen TB/MDR-TB services in Papua New Guinea; and
(5) to assess the impact of the investments made on the development of TB/MDR-TB services in Papua New Guinea on overall health systems strengthening.

2. BACKGROUND

Since 1995, multidrug-resistant TB (MDR-TB) has been informally addressed through clinical treatment physicians' clinics, particularly in Port Moresby, Papua New Guinea, using locally-available, second-line anti-TB drugs. In June 2010, WHO technical assistance[1] was sought to develop the national guidelines for the programmatic management of drug-resistant TB (PMDT), and recommend a framework for MDR-TB activities to be incorporated in the NTP strategic plan 2011-2015. On 16-21 October 2011, an independent review of TB control including MDR-TB was done in South Fly District of the Western Province,[2] in light of its reportedly high prevalence of TB, location at the external border of Papua New Guinea and cross-border issues with Australia. After finalization of the country guidelines in 2011,[3] WHO, in collaboration with the National Department of Health

[1] Technical assistance for the Programmatic management of multidrug-resistant TB in Papua New Guinea: Mission Report. Jun 28-Jul 7, 2010. MID Quelapio

[2] Technical assistance mission to South Fly District, 15-21 Oct 2011. D. Enarson, C. van Weezenbeek, E. Heldal, K. Johnson and S. Ahmadova

[3] National Guidelines for the Programmatic Management of Drug-resistant TB (PMDT), 2011: Papua New Guinea, National Department of Health NTP

(NDOH), conducted a training of trainers on PMDT [4] attended by the NTP, provincial physicians, and partners. Since then, at least five provinces have started treating MDR-TB in a more or less programmatic manner.

Papua New Guinea has been implementing Round 6 (R6) of the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) since 2007. However, this Global Fund support ends in March 2013. Global Fund support has enabled DOTS to complete expansion to all 20 provinces of Papua New Guinea in 2012, from only nine provinces between 2007-2011. No part of the Global Fund grant is budgeted for PMDT activities except for a portion of the drug resistance surveillance (DRS) cost together with funding from the Australian Agency for International Development (AusAID) and WHO. The Government of Papua New Guinea procures second-line drugs (SLDs) for MDR-TB treatment in the country, except in the Western Province which is also supported by AusAID.

3. ACTIVITIES AND FINDINGS

3.1 Activities

The team had discussions with several persons associated with the NTP of the country (see Annex). Two sub-teams were formed to be able to visit two different places. Team 1 visited Daru of South Fly District of the Western Province and team 2 visited Lae of Morobe Province. Both teams visited hospitals, health centres and laboratories and reviewed activities with the national staff. The team also reviewed data and reports of case detection and treatment outcomes from the last several years. Findings from the discussions and reviews are highlighted in the next section.

3.2 Findings

There is clear progress in TB prevention and control in South Fly since the last visit in 2011. Health staff has been trained; transportation and communication has improved, health facilities are supervised, and outreach activities are implemented. Facilities are better supplied with general drugs. Smear microscopy has been established in some health centres. Daru hospital has been equipped with a digital X-ray, a biochemistry machine and GeneXpert. Better diagnosis has led to an apparent increase in the number of patients notified with TB and MDR-TB. The use of fixed-drug combination (FDCs) has been expanded outside Daru Island. TB patients of Papua New Guinea on treatment in Australia have been handed over and followed up in Daru hospital. Multidrug resistant tuberculosis patients were promptly started on MDR treatment and have shown promising results so far. The number of deaths in MDR-TB patients has declined sharply and patients adhere to DOT. Infection control has been strengthened in Daru hospital where a new TB ward is under construction. Overall, confidence in public services has increased where health centres and aid posts have been equipped and medicines have been procured. Lastly, a project funded by AusAID has begun closer coordination and collaboration with South Fly district health services.

[4] Internal Mission Report on the Training on the Programmatic Management of Drug-resistant TB (PMDT), PNG. Nov 7-11, 2011. MID Quelapio, K Johnson, R. Pastore and S. Ahmadova

The major challenge identified during this mission is the fast-approaching potential disruption of critical functions in the TB control programme. These functions are mainly, - monitoring, supervision, procurement and supply chain management, currently assumed by Jane Thompson Association International (JTAI), a Global Fund-supported partner. Continuity of the NTP is in danger, as the Global Fund R6 is ending in March 2013, barely three months from this mission, with no concrete plans to move services to NDOH. Other challenges were identified. Human resources for TB programme management are lacking in both quantity (no available posts especially in provinces, no fulltime post for PMDT, and existing but vacant posts), and quality (lack of accountability, absenteeism, too frequent travels for meetings and trainings). Other challenges are the overall frail DOTS and PMDT implementation which is likely to generate more multidrug resistant tuberculosis/extensive drug-resistant tuberculosis (MDR-/XDR-TB). The programme faces:

a) high default rates in DOTS (14% among new smear-positives; 17% among retreatment, and 28% among other cases), and interruption in first-line (and second-line) drug supply in most facilities due to the Global Fund disbursement suspension in 2011, change in principal recipient and long lead time in the drug procurement process (delayed government fund release, several steps in obtaining signatures and approvals, and Global Drug Facility/GDF requirements);

b) weak case-finding (aid posts, health centres and smear microscopy centres are not accessible and insufficient in certain areas); no culture and drug sensitivity testing (DST) done in-country, and lack of funds to send specimens of drug-resistant TB suspects to the supranational laboratory in Brisbane, Australia;

c) lack of compliance with PMDT guidelines in some settings regarding treatment, such as the use of four core drugs, the right dosages and drug duration; and

d) lack of training in PMDT recording and reporting.

The detailed report on various aspect of programmatic management of drug resistant tuberculosis (PMDT) is attached as an Annex.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Milestones have been achieved in DOTS and PMDT in Papua New Guinea. Although further strengthening is required, DOTS has been expanded to the 20 provinces of the country; the Government has opted for FDCs throughout the country for adults and children, and quality-assured second-line drugs (SLDs) for MDR-TB procured through Global Drug Facility (GDF); at least five provinces are treating MDR cases programmatically after the training of trainers in late 2011 and results in Western Province are promising with, so far, very low fatality and default rates; and despite the lack of culture and DST in Papua New Guinea, GeneXpert MTB/RIF is now available for routine use in the National Capital District, Western Province and soon, in Madang and Morobe. Last but not least, drug resistance surveillance is now in progress (piloted in two areas, and soon to be piloted in two other provinces).

4.2 Recommendations

(1) The National Department of Health (NDOH) and national tuberculosis control programme (NTP) may consider developing a transition plan to prepare for the period after Global Fund, and describes in detail how government services will cover essential components of NTP, including adequate staffing, supervision and monitoring at all levels. A gap analysis for comprehensive budget planning to include PMDT operations may be done.

(2) A detailed human resource plan may be developed to ensure capacity to implement the programmatic interventions for DOTS and PMDT, including training and supervision for diagnostic and treatment aspects. NDOH may consider designating a full-time PMDT focal point, and increasing staffing in the central public health laboratory (CPHL) in preparation for culture and DST (after workload analysis).

(3) Provincial and district health offices may find it helpful to assume key roles in the planning and implementation of TB prevention and control, to ensure sustainability, using the provincial implementation plan (AIP) to work jointly towards full provincial access to quality diagnosis (microscopy network) and treatment of TB.

(4) NDOH and CPHL may define the function of the national reference laboratory and consider strengthening centralized functions and decentralizing other tasks (external quality assurance (EQA) and microscopy). The drug resistance survey may be prioritized.

(5) NDOH and NTP may focus on strengthening central monitoring and supportive supervision by qualified staff to ensure quality treatment in light of rapid diagnostics.

(6) NDOH and NTP may strengthen logistics for drugs (general and TB/MDRTB), ensuring proper buffer stock and involvement of provinces and districts in planning and distribution.

(7) Strengthening the recording and reporting system may also be considered. Further technical assistance in this regard by WHO may be explored.

5. ACKNOWLEDGEMENTS

The team would like to acknowledge the following: the National Department of Health, Papua New Guinea (Disease Control Branch, National TB Programme), the Central Public Health Laboratory, Badili and Morobe Area Medical Stores, the Provincial Health Offices of the National Capital District (NCD), Morobe, and Western Province, basic management units of Butibum (Lae District, Morobe), Badili (NCD), and Mabuduan (Western Province); Port Moresby General Hospital, Angau Hospital and Daru General Hospital, World Vision Foundation International and WHO-Country Office in Papua New Guinea.

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ANNEX 1

Standard Monitoring Report Form (for consultants)

PMDT MONITORING REPORT

Programme: Country: Papua New Guinea

Lead implementing agency: National Department of Health National TB Control Programme

Inclusive dates of mission: 23-30 November 2012

Author(s): Dr Catharina van Weezenbeek (Lead of mission)
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Acknowledgments:

Acknowledgment is hereby made to the National Department of Health, Papua New Guinea (Disease Control Branch, National TB Programme), the Central Public Health Laboratory, Badili and Morobe Area Medical Stores, the Provincial Health Offices of the National Capital District (NCD), Morobe, and Western Province, BMUs of Butibum (Lae District, Morobe), Badili (NCD), and Mabuduan (Western Province); Port Moresby General Hospital, Angau Hospital and Daru General Hospital, World Vision Foundation International and WHO-Country office.

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Separate files on the Visit to Daru (Report and Tables) *form part of this Mission Report.*

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Acronyms

AMS	Area Medical Store
AusAID	Australian Agency for International Development
BMU	Basic Management Unit
BSC	Biosafety cabinet
BSL	Bio-safety Level
CHW	Community Health Worker
CF	Case Finding
Cm	Capreomycin
CPHL	Central Public Health Laboratory
Cs	Cycloserine
DGH	Daru General Hospital
DRS	Drug resistance surveillance
DR-TB	Drug-resistant TB
DST	Drug susceptibility test
EP	Extrapulmonary
Eto	Ethionamide
EQA	External quality assurance
FDC	Fixed drug combination
FEFO	First expiry-first out
FLD	First-line drug
FQ	Fluoroquinolone
GeneXpert MTB/RIF	Rapid Molecular Assay for TB/RIF
GDF	Global Drug Facility
GLC	Green Light Committee
GF/Global Fund	Global Fund to fight AIDS, TB and Malaria
HBC	High burden country
HC	Health center
HIV	Human Immunodeficiency Virus
HWW	Hope Worldwide
IC	Infection control
JTAI	Jane Thompson Association, International
Km	Kanamycin
Lfx	Levofloxacin
MDR-TB	Multidrug-resistant TB
Mfx	Moxifloxacin
M&E	Monitoring and Evaluation
NCD	National Capital District
NDOH	National Department of Health
NTP	National TB control Programme
NRL	National TB Reference Laboratory
NSP	New smear-positive
Ofx	Ofloxacin
PAS	Para-aminosalicylic acid
PDCO	Provincial Disease Control Officer
PHO	Provincial Health Office
PMGH	Port Moresby General Hospital
PNG	Papua New Guinea
PPM	Public-private mix
PT	Proficiency testing
PMDT	Programmatic management of drug-resistant TB
QMRL	Queensland Mycobacterium Reference Laboratory
RAD	Return after default
RIF	Rifampicin
rGLC	Regional Green Light Committee
RLA	Rural Laboratory Assistant
SLDs	Second-line drugs
SOP	Standard Operating Procedure
SMC	Sputum Microscopy Centre
SRL	Supranational Reference Laboratory
TAT	Turn-around time
WHO	World Health Organization
WVI	World Vision International
WPR	Western Pacific Region
XDR-TB	Extensively drug-resistant TB

ANNEX 1

I. Executive summary: *Not more than 1-2 pages*

- **Findings/Observation**

a) ***Progress*** *from the last mission (The last mission was from 15 to 21 October 2011 to evaluate the TB services in the South Fly District in Western Province, Papua New Guinea). Two separate files (report and tables) on the Visit to Daru accompany this Mission Report.*

There is clear progress in TB prevention and control in South Fly since the last visit. Health staff have been trained; transport and communication improved; health facilities supervised and outreach activities implemented. Facilities have been better supplied with general drugs. Smear microscopy has been established in some health centers. Daru Hospital has been equipped with a digital x-ray, a biochemistry machine and GeneXpert. Better diagnosis has led to an apparent increase in the number of patients notified with TB and MDR-TB. The use of fixed drug combination (FDC) drugs has been expanded outside Daru Island. TB patients on treatment in Australia have been handed over and followed up in Daru Hospital. MDR-TB patients have been promptly started on MDR treatment with promising results so far. The number of deaths in MDR-TB patients has declined sharply and patients adhere with DOT. Infection control has been strengthened in Daru Hospital where a new TB ward is under construction. Overall, confidence in public services has increased where health centers and aid posts have been equipped and medicines procured. Lastly, the AUSAID funded project has started closer coordination and collaboration with South Fly district health services.

b) ***Key challenges*** *identified in this mission (Current Mission was conducted from 23 to30* ***November*** *2012 to evaluate the PMDT implementation in Papua New Guinea as the main term of reference). Mission TORs are in* ***Annex 1.*** *Mission schedule and people met are in* ***Annex 2.*** *Actions to last year's mission recommendations are in* ***Annex 3****.)*

The major challenge identified in this mission is the fast approaching potential disruption of critical functions in the TB control programme mainly, monitoring and supervision, and procurement and supply chain management which are currently assumed by a Global Fund-supported partner, JTAI. Global Fund R6 is ending in March 2013, barely three months from this mission, with no concrete plans for integration of services to the NDOH, endangering the programme's collapse. Other challenges were identified. Human resource for TB is lacking in both quantity (no available posts especially in provinces, no fulltime post for PMDT, and existing but vacant posts), and quality (accountability, absenteeism, too frequent travels for meetings and trainings). Other challenges are the overall frail DOTS and PMDT implementation which is likely to generate more MDR-/XDR-TB. The programme is faced with a) high default rates in DOTS (14% among new smear-positives; 17% among retreatment, and 28% among other cases), and interruption in first-line (and second-line) drug supply in most facilities, firstly due to the Global Fund disbursement suspension in 2011, and change in principal recipient; b) long lead time in the drug procurement process (delayed government fund release, several steps in obtaining signatures and approvals, and Global Drug Facility/GDF requirements); c) weak case-finding (aid posts, health centers and smear microscopy centers are not accessible and insufficient in certain areas); no culture and DST done in-country, and lacking funds to send specimens of drug-resistant TB suspects to the supranational laboratory in Brisbane; d) lack of compliance to PMDT Guidelines in some settings regarding treatment, such as, the use of four core drugs, the right dosages and drug duration and; e) lack of training in PMDT recording and reporting.

c) *Current status of country **PMDT implementation** based on the data in the Annexes: accomplishment against program and project (Global Fund) targets*

Milestones have been achieved in DOTS and PMDT. Although needing strengthening, DOTS has been expanded to the 20 provinces of Papua New Guinea; the Government has opted for FDCs throughout the country for adults and children, and quality-assured second-line drugs (SLDs) for MDR-TB procured through GDF; at least five provinces are treating MDR cases programmatically after the training of trainers in late 2011 and results in Western Province are promising with, so far, very low fatality and defaulter rates; and despite the lack of culture and DST in PNG, GeneXpert MTB/RIF is now available for routine use in the National Capital District, Western Province and soon, in Madang and Morobe. Last but not least, the drug resistance surveillance is now in progress (pilot in two areas, and soon to be piloted in two other provinces).

- **Conclusion: priority recommendations**

Not more than 10. Straightforward recommendations should be discussed and agreed with the NTP during the debriefing. Complex recommendations are to be discussed first with the rGLC.

Recommendations (not more than 10)	Responsible agency/person	Time frame
Sustainability		
• Develop a transition plan to prepare for the post-GF era, which describes in detail how government services will cover essential components of the TB programme, with adequate staffing and supportive supervision and monitoring at all levels.	NDOH - NTP	Urgent: mid- Jan 2013
• Consider to undertake a gap analysis for comprehensive budget planning to include PMDT operations	NDOH - NTP	Jun 2013
Human resource		
• Fully integrate supply chain management for TB and MDR-TB, and monitoring and evaluation under the umbrella of the NTP	NDOH	Urgent: mid-Jan 2013
• Take key roles in planning and implementation of TB prevention and control, to ensure sustainability, using the provincial implementation plan (AIP) to work jointly towards full provincial access to quality diagnosis (microscopy network) and treatment of TB.	Provincial and District health offices	15 Feb 2013
• Develop an HR plan to ensure capacity to implement the programmatic interventions for DOTS and PMDT, including training and supervision for diagnostic and treatment aspects.	NDOH	15 Jun 2013
• Designate fulltime PMDT Focal point, and increase staffing in CPHL in preparation for culture and DST in-country (after workload analysis).	NDOH, CPHL	Urgent: Jan 2013

ANNEX 1

Laboratory • Define function of the national reference laboratory and consider strengthening centralized functions and decentralization other tasks (EQA and microscopy). • Prioritize the drug resistance survey and ensure very close supervision of all processes involved.	Central Public Health Lab (CPHL) with NDOH CPHL and NDOH	Jun 2013 Continuing
Treatment • Ensure quality treatment in light of rapid diagnostics by strengthening central monitoring and supportive supervision by qualified staff.	NDOH - PMDT Core Team	Apr 2013
Drug management and logistics • Strengthen logistics for drugs (general and TB/MDRTB), ensuring proper buffer stock and involvement of provinces and districts in planning and distribution.	NTP and PMDT Core Team	Mar 2013
Recording and reporting: • Strengthen recording and reporting; request for technical assistance	NTP through the PMDT Core Team	Jan 30 2013

II. Detailed report:

Please keep the descriptions short. Use tables, graphs or charts for data presentation. Provide feasible and context-oriented recommendations. Specify the responsible agencies/persons and timeframe for the recommendations.

A. Introduction/Background

Since 1995, MDR-TB has been informally addressed through clinical treatment offered in physicians' clinics particularly in Port Moresby, using locally available second-line anti-TB drugs. In June 2010, WHO technical assistance[1] was sought to develop the National Guidelines for the Programmatic Management of Drug-resistant TB (PMDT), and recommend a framework for MDR-TB activities to be incorporated in the NTP Strategic Plan 2011-2015. From 16 to 21 October 2011, an independent review of TB control including MDR-TB was done in South Fly District of the Western Province,[2] in view of its reportedly high prevalence of TB, and being at the external border of Papua New Guinea with cross-border issues with Australia. After finalization of the Country Guidelines in 2011,[3] WHO, in collaboration with the National Department of Health (NDOH) conducted a Training of Trainers on PMDT [4] attended by the NTP, provincial physicians, and partners. Since then, at least five provinces have started treating MDR-TB in a more or less programmatic manner.

PNG has been implementing Round 6 of the Global Fund (GF) for TB since 2007 which ends in March 2013. This has enabled DOTS to be expanded to all 20 provinces of PNG this 2012, from only 9 provinces between 2007 and 2011. No part of the GF grant is budgeted for PMDT activities except for a portion of the drug resistance surveillance (DRS) cost

[1] Technical assistance for the Programmatic management of multidrug-resistant TB in Papua New Guinea: Mission Report. Jun 28-Jul 7, 2010. MID Quelapio
[2] Technical assistance mission to South Fly District, 15-21 Oct 2011. D. Enarson, C. van Weezenbeek, E. Heldal, K. Johnson and S. Ahmadova
[3] National Guidelines for the Programmatic Management of Drug-resistant TB (PMDT), 2011: Papua New Guinea, National Department of Health NTP
[4] Internal Mission Report on the Training on the Programmatic Management of Drug-resistant TB (PMDT), PNG. Nov 7-11, 2011. MID Quelapio, K Johnson, R. Pastore and S. Ahmadova

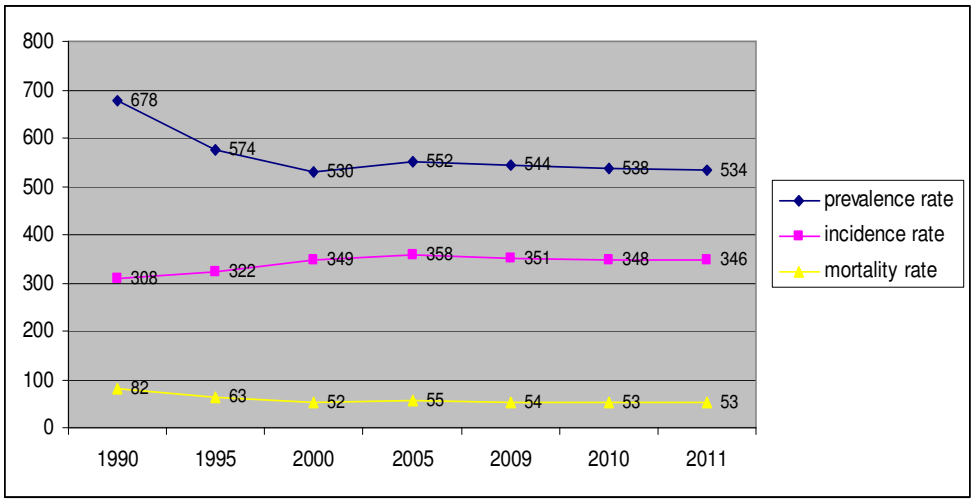
together with funding from AusAID and WHO. The Government of Papua New Guinea procures second-line drugs (SLDs) for MDR-TB treatment in the country, except in the Western Province which is also supported by the Australian Agency for International Development (AusAID).

B. Existing TB control programme

Findings:
DOTS was introduced in Papua New Guinea in 1997 starting in the National Capital District (NCD) in Port Moresby and Lae District in Morobe province.[5]

Estimated TB burden: Papua New Guinea had a population of 7 million in 2011. It ranks 2nd in the Western Pacific Region (WPR) next to Cambodia, in terms of estimated TB incidence (including HIV+TB) and TB mortality, 1st in estimated incidence of HIV+ TB, and 3rd in terms of estimated prevalence (including HIV +TB), next to Cambodia and Laos.[6] According to WHO, TB (including HIV) incidence in 2011 was 346 per 100,000 population (24 000 cases), and prevalence was 534 per 100 000 (37 000 cases). Mortality rate excluding HIV was 53 per 100 000 (3700 cases). TB incidence among HIV-positives was 30 per 100 000 (2100 cases). Case detection for all forms of TB was reported to be 61%. It needs to be stressed that the above estimates have large confidence intervals and are not based on a solid evidence base, such as, prevalence survey results. Recent prevalence survey results in Lao PDR show that the actual burden of disease may be much higher than previously estimated by WHO in the absence of a survey data. And, in fact, the intensified TB control efforts in Daru have resulted in very worrisome case detection figures for Western province, which suggest that Papua New Guinea rates may be higher than estimated, so far. Preliminary case detection data in Western Province for the first three quarters of 2012 indicate an overall annual notification rate of 678/100 000; and a smear-positive notification rate of 200/100 000.

Figure 1. TB burden in Papua New Guinea, 1990-2011 [6]



Notification: Table 1 below shows the case notification in the last four years. DOTS was expanded in Papua New Guinea in a phased approach since 2009 through the Global Fund

[5] Country status report of the National TB Program, Papua New Guinea (1997-2005), NTP, NDOH
[6] World Health Organization. Global tuberculosis control 2012. WHO/HTM/TB/2012.16. Geneva, Switzerland

in addition to Government resources. To interpret case notifications the coverage of reporting needs to be assessed. While 15 to 18 out of 20 provinces submitted quarterly reports in 2010, the number declined to 12 to 15 in 2011 while all provinces reported in 2012 (except Sandaun/West Sepik in two quarters). To assess the role of coverage, also the proportion of districts reporting needs to be followed. Notification in 2011-2012 per province is shown in **Annex 4.**[7, 8] The rates of all TB in 2012 range from 68 in Sandaun (but one quarter missing) to 1678 in NCD. The rates of new smear-positive (NSP) TB cases increased from 2011 to 2012, but are still very low in all provinces.

An increase is noted both in the total notification and in NSP cases from 2009-2012 **(Table 1)**; however, new smear -negatives actually decreased. Noticeable are the very high proportions of both Smear Not Done (24%-33%) and EP TB cases (36%-39%). "Smear not done" represented 60% of all pulmonary cases in the 3rd quarter 2012, 24% had positive smear and 16% negative smear.

The proportion of smear-positive retreatments is very low – only 2% of all TB cases reported in Q3 2012 (n=141), 32% are relapses; 54% return after default (RAD), while failures comprise only 14%. If "other negatives" are considered part of retreatment, total retreatment cases would be 9%.

Table 1. Notification of TB cases, Papua New Guinea (2009 – 2012) [6, 7]

Year	Smear - positive					Smear negative	Smear not done	Extra-pulmonary	Other negative*	TOTAL
	New	Relapse	Failure	RAD	Total retreatmt*					
2009	2238	1388			1388	4768		4826	272	13492
	17%				**10%**	**35%**		**36%**	**2%**	100%
2010	2530	242	55	147 -	444	1949	3836	5805	1378	15942
	16%	54 %	12%	33%	**3%**	**12%**	**24%**	**36.4%**	**8.6 %**	100%
2011	1860	139	40	122	301	1342	5132	6337	1260	16232
	11 %	46 %	13%	41%	**2%**	**8%**	**32%**	**39%**	**8%**	100%
2012 (9months)	2066									16099
2012 9m* 1,33	2748									21412
2012 3Q	777	45	20	76	141	503	1933	2023	397	5774
	13	32 %	14 %	54 %	**2 %**	**9 %**	**33 %**	**35 %**	**7 %**	100 %

[7] Summary Reports for 2011, NTP, Department of Health, 15 Mar 2011 M& E Review
[8] NTP M & E data overview, Quarterly summary: 2012 Q2: Apr-Jun 2012

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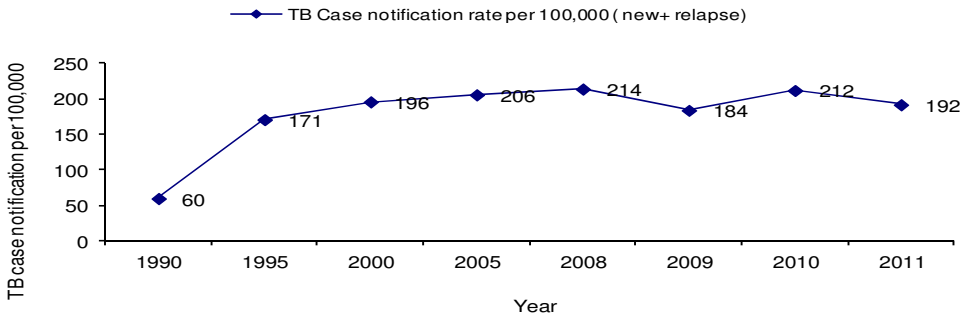


Figure 3: Case notifications by province 2011-2012:
All TB Cases per 100,000 population

(2012 based on reports from three quarters multiplied with 1.33 to project the whole year)

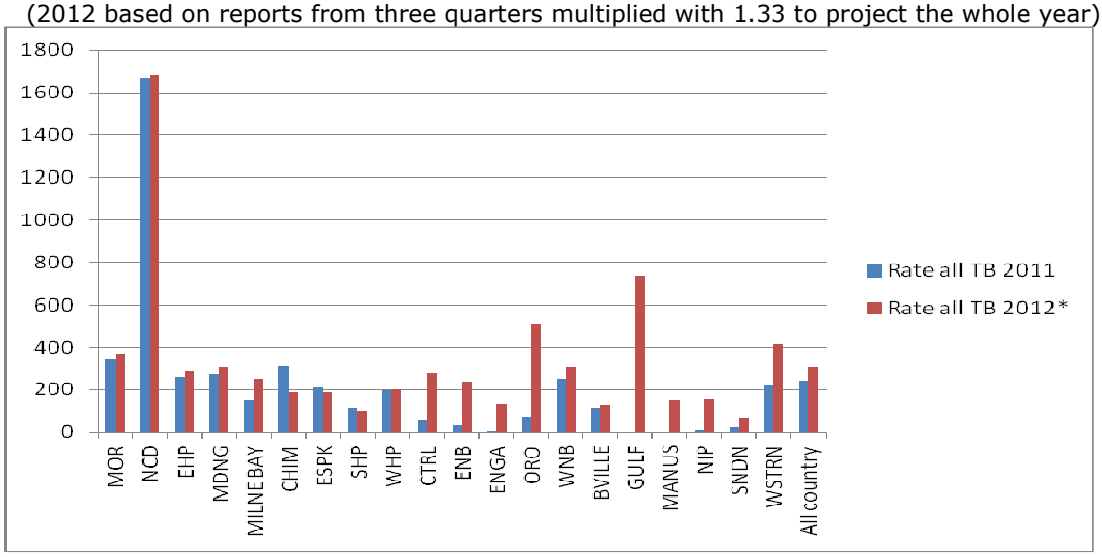
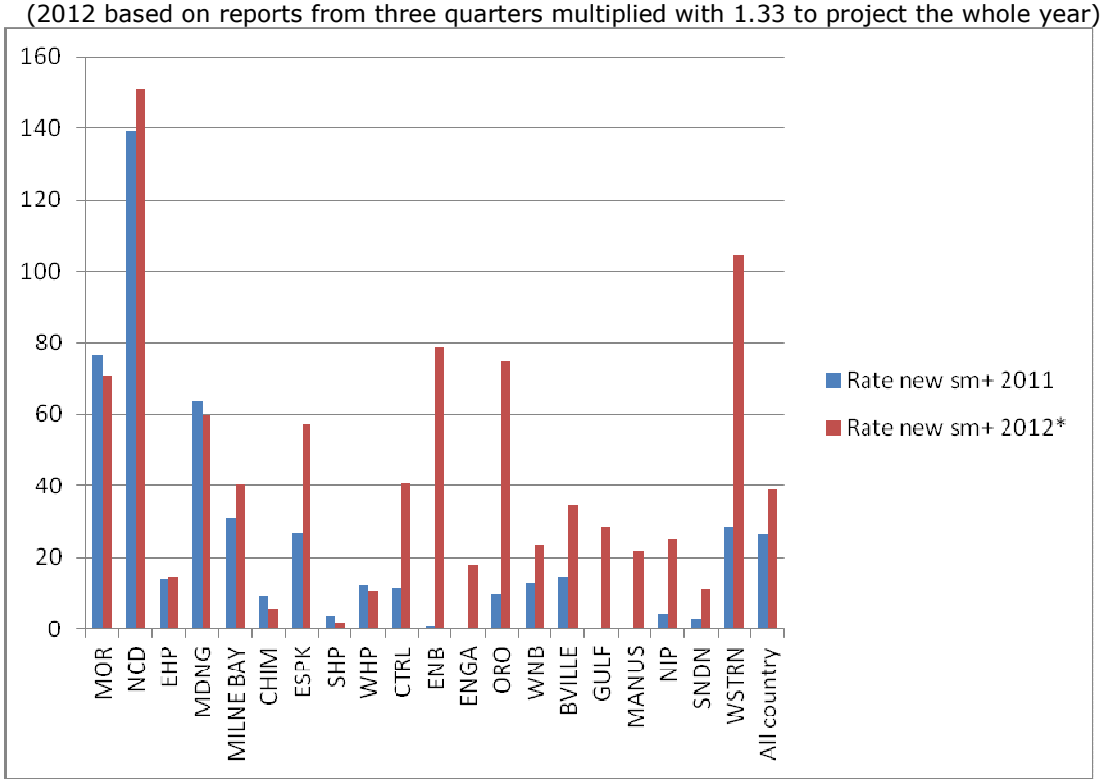


Figure 4: Case notifications by province 2011-2012:
NSP TB cases per 100 000 population
(2012 based on reports from three quarters multiplied with 1.33 to project the whole year)

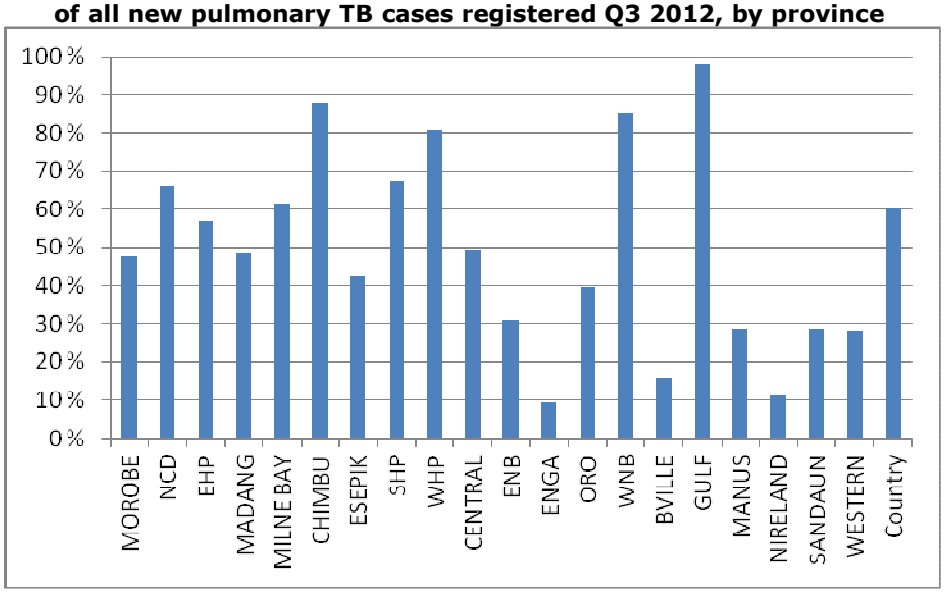


Smear not done (SND)
In one BMU visited during this mission, 16% had no sputum examination done among 193 TB symptomatics seen in Q1-Q3 2012 **(Annex 5)**. Some of the possible reasons for the high proportion of SND are: (a) long turn-around time (TAT) of smears (sometimes up to 2 weeks), (b) difficult access to smear (in Lae district with a population of 152,804, there are 10 health facilities with only one functional smear microscopy center (SMC), (c) preferred diagnostic modality is still chest x-ray (CXR) or clinical grounds; more training is needed.

Among the 20 provinces, the proportion of SND in the Q3 2012 ranges from 9%-98% **(Figure 5, Annex 6**). The level is far too high in all provinces except three: Enga, Bougainville and New Ireland where the level is below 20%.[9]

[9] NTP M&E data analysis sputum results NDNA for the period 2011 Q3- 2012 Q2 (Source: NTP BMU database)

Figure 5: Percentage of patients with "Smear not done" of all new pulmonary TB cases registered Q3 2012, by province



Extrapulmonary TB
Table 1 shows EPTB at 43% among all cases, the highest in the WPR in 2011. **Annex 6** also shows the provinces with the largest proportions of EPTB cases: Eastern Highlands (EHP, 62%), Manus and Western Province (50% each).[7] This high proportion warrants review of possible causes, including diagnostic errors and TB/HIV.

Age and Sex
The proportion of 0-14 years detected was 21% in 2011 (3501 children among 16,324 cases notified in 2011.[6] According to the quarterly reports based on the BMU register (for South Fly district) in Q2 and Q3 2012, the proportion of pediatric TB cases declined from one third to less than 10%, probably too low.

TB/HIV
HIV testing rate among NSPs increased from 14% to 24% from 2009-2011, and from 6% to 14% among retreatment cases. TB/HIV co-infection ranges from 9%-14% among NSPs, while among the retreatment patients, it is 11%-12%.[7]

Table 2. TB/HIV prevalence among NSP and all TB cases 2009-2011, all provinces, Papua New Guinea [7]

Year	Notified TB cases	Referred HIV	No (%) tested	TB+ HIV+ (prevalence)
Among NSPs				
2009	568	101	80 (14%)	14 (18%)
2010	2530	625	553 (22%)	51 (9%)
2011	1860	626	441 (24%)	60 (14%)
Among all TB cases				
2009	3372	251	219 (6%)	24 (11%)
2010	15942	2638	2230 (14%)	235 (11%)
2011	16232	2913	2222 (14%)	272 (12%)

Treatment outcome

The table below shows the 2011 treatment outcomes of NSPs, retreatment cases and all other cases. Evaluated cases vs. registered range from 73%-82% indicating that 18-27% of TB cases are unevaluated, either because the information is missing or because they are left untreated, and likely responsible for prolonged transmission in the community.

Treatment outcomes for 2011 show need for improvement, with success rate among NSPs as low as 57% and default rates as high at 14%. As expected, success and default rates are even worse among retreatment cases (45% and 17%, respectively). The poor outcomes among 'all other cases' (49% success and 28% default) suggest a selection bias and/or programmatic failure which requires careful analysis. [7]

Table 3. Treatment outcome, NSPs and retreatment cases and other cases 2011, Papua New Guinea [7]

	Cure	Completed	Died	Failed	Defaulted	Transferred out	Total w/ outcome	Not evaluated
New *Registered: 2,530* *Evaluated: 1995 (78%)*	1181 **46.7%** **Success: 56.6%**	251 **9.9%**	84 **3.3%**	43 **1.7%**	348 **13.8%**	88 **3.5%**	1,995 78%	535 21%
Retreatment *Registered: 444* *Evaluated: 324 (73%)*	150 **33.8%** **Success: 44.8%**	49 **11%**	20 **4.5%**	18 **4%**	75 **16.9%**	12 **14.2%**	324 73%	120 27%
All other cases *Registered: 12,968* *Evaluated: 10,705 (82%)*	28 **Success: 49.1%**	6339	353 **2.7%**	57 **0.4%**	3607 **27.8%**	321 **2.5%**	10,705 82.5 %	2,263 17.5 %

Success rates among NSPs range from 34% (Oro) to 100% (Sandaun); but cure rates range from 7% (East Sepik) to 75% (Morobe). There are eight provinces with cure rates <60%. Default rates range from 0% (Sandaun) to as high as 57% (Oro). There are nine provinces with default rates >10% **(Annex 7A)**. Among the retreatment, range of success is 20%-100%, while cure rates range from 0% in E. Sepik, S. Sepik and Oro to 88% in Chimbu (some numbers are too small and should be dealt with carefully). Default rate is highest in WNB (80%). Obviously, settings reporting 100% success and 0% default require supportive supervision to assess data quality as these results are rare, even when only 34 patients are involved as is the case in Sandaun. The wide variety of outcomes among provinces fits the profile of a country that has only recently introduced DOTS in a stepwise manner and still has a fragile DOTS programme **(Annex 7B).**

Preliminary data for NSPs registered during the first three quarters in 2011 (table below) indicated that the number evaluated corresponded better to the number notified but the outcome showed no improvement: decline in success rate from 72% to 69% and increase in default and failures. The low death rate raises questions whether smear-positive TB patients who die before treatment start are included.

Table 4: Treatment outcome 2011 first three quarters, NSP cases
(from 121116 2012Q3 Qwik M&E Summary.xls, sheet outcomes)

Qtr	Registered	Evaluated	Cure	Completed	Died	Failure	Default	Trans	Not evaluated
2010 all	2084	2099	1228	274	88	48	367	94	-15
% outcome	100 %	101 %	59 %	13 %	4 %	2 %	18 %	5 %	-1 %
			Success: 72%						
2011 Qs 1-3	1678	1642	898	258	66	48	323	49	36
% outcome	100 %	98 %	54 %	15 %	4 %	3 %	19 %	3 %	2 %
			Success: 69%						

NTP structure:
The National TB Program (NTP) is headed by the NTP Manager who reports to the Head of the Disease Control Division of the National Department of Health (NDOH). The NTP is the central coordinating body that facilitates all activities in TB control. Its main functions are policy, guidelines, and manual development, planning, budgeting, providing oversight and direction, setting targets, monitoring and supervision, training, maintaining consolidated reports of TB performance, human resource development, drug management, coordination of all stakeholders, and advocacy. There are four posts at the central unit of the NTP for DOTS Regional Medical Officers tasked to handle the monitoring and supervision in 20 provinces in the country; however, only three posts have been occupied.

The Provincial level is headed by a Provincial Disease Control Officer (PDCO), assisted by Nursing Officers or Health Extension Officers (HEO). A TB/Leprosy Officer is a fulltime post for TB activities; however, only five of the 20 (25%) provinces have established this post. The main functions of this level are coordination and supervision of the provinces and districts, training of BMUs, supply chain management, compiling BMU reports, and sending them to the central level; coordination of referrals and transfers to provincial hospitals and laboratories, etc.

The District level is headed by the District Disease Control Officer (DDCO) whose functions are supervision and monitoring of BMUs in the performance of DOTS, ensuring early and reliable diagnosis, timely initiation of treatment, and referral of complicated cases to provincial hospitals. The BMUs or health centres are manned by a nursing officer assisted by community health workers (CHWs) who function as DOT providers. Some provinces, such as, the Western Province, have Aid Posts which comprise the most basic unit. These are small facilities supplied with basic medications and with one CHW each. A cluster of Aid Posts is supported by a health centre, a larger facility with more staff able to provide more services.

Factors that could be responsible for drug resistance
For a long time, Papua New Guinea was faced with the challenge of uncertain and meager funds for TB control. [5, 10] Loose TB drugs were obtained from local procurement until recently, while fixed drug combination drugs (FDCs) were only introduced recently. FDCs are procured through the Global Drug Facility (GDF). The long term use of loose drugs of uncertain quality, the related compliance problems (a high pill burden for patients), and the low reach of the DOTS strategy (smear microscopy, DOT, regular drug supply linked to weak recording and reporting) until recently have no doubt contributed to the emergence of drug resistance in the country. The use of SLDs that the Government of Papua New Guinea has supplied to big hospitals may in turn lead to XDR-TB, if not properly managed.

Conclusions:
Despite efforts made to strengthen and expand the DOTS programme, data and observations suggest that in some provinces the programme is still very weak and not all factors contributing to drug resistance have been neutralized.

- There is a high proportion of non-performance of smear among symptomatic and TB cases started on treatment, and a high proportion of EPTB.
- HIV testing among NSPs increased to 24% in 2011, but needs further strengthening given elevated rates of TB/HIV co-infection (12-14%).
- Data suggests that a considerable proportion (18-27%) of registered TB cases are treated but not evaluated leading to incomplete treatment outcome data.
- Cure and success rates are low (57% among new and 45% among retreatment patients), and default is high (14% and 17%, respectively). More importantly, data show that the vast majority of registered patients have been classified as 'other cases' with even poorer outcomes, suggesting major weaknesses in TB programme performance.

Recommendations:
NTP to:

- Ensure regular supportive supervision to improve recording and reporting; use it to assess the performance of the TB programme. Investigate, and if necessary, address reasons for low performance, including a) low registration among notified, b) high default rates among those started on treatment, c) high EPTB rate and d) high proportion of 'other cases'; and
- Aim to increase a) evaluation of registered cases to 100% addressing factors that hinder this, b) HIV testing among TB cases.

C. Information on M-/XDR-TB

Findings:
The country's first DRS involving four provinces (NCD, Western Province, Madang and Morobe) is now almost commencing. This will include 13 districts and 27 health facilities in Papua New Guinea. The estimated sample size is 978, from new sputum smear-positive patients and all retreatment cases. Two GeneXpert MTB/RIF machines have already been operational at the Central Public Health Laboratory (CPHL) in NCD and in Daru General Hospital (DGH) in Western Province, and used in conducting a pilot study in preparation for the DRS. The Xpert machines in Madang and Morobe have arrived and will be installed and functioning by end of Dec 2012; refrigerators are still being awaited. At the moment, WHO estimates that for 2011 the MDR-TB rate among new cases at 4.9% and among retreatment cases at 23%. [6]

Pending representative DRS results, there is limited information on the magnitude of drug resistance in the country. Local studies from localized populations since 2008 showed varying

[10] Report of Joint Review Mission for National TB Program in Papua New Guinea (2006-2010) NTP, NDOH

MDR-TB rates (41% in a study done by the CPHL, 2008-2010; 6% by Papua New Guinea-Institute of Medical Research/IMR, 2009-2011, and 46% by DGH, 2009).

More recent data are available from the Queensland Mycobacteriology Laboratory (QMRL) on the drug susceptibility test (DST) patterns from 2008-2011 of 69 samples sent by CPHL from NCD, Morobe, Madang, Milne Bay and Western Province, where the overall MDR rate is 57%; poly-resistance 7%; mono-resistance 9% and susceptible 28% (**Table 5**).

It needs to be stressed that all available data on drug resistance bring the risk of selection bias and are most probably not representative of the distribution of drug resistance among new and previously treated patients in Papua New Guinea. Therefore, the planned DRS is crucial for a better understanding of the magnitude and nature of the DR-TB problem and planning of PMDT services.

Table 5. DST patterns of CPHL specimens from NCD, Morobe, Madang, Milne Bay and W. Province done in QMRL, 2008-2011 (n=69)

DST pattern	2008 (n=6)	2009 (n=32)	2010 (n=22)	2011 (n=9)	TOTAL (n=69)
Susceptible	0	8 (25%)	6 (27.3%)	5 (55.6%)	19 (28%)
Mono-resistant	2 (33.3%)	2 (6.25%)	2 (9.1%)	0	6 (9%)
Poly-resistant	0	2 (6.25%)	2 (9.1%)	1 (11.1)%	5 (7%)
Multidrug-resistant	4 (66.7%)	20 (62.6%)	12 (54.5%)	3 (33.3%)	**39 (57%)**

Apart from the above, information on 60 specimens from Western Province independently sent by DGH to QMRL from 2010-2011 through the AusAID project shows that the MDR rate in that selected sample is also 57% **(Table 6**). The rate of susceptible samples from DGH is likewise comparable to that coming from other provinces **(Table 5,** 27% and 28%). No cases of extensively drug-resistant TB (XDR-TB) were detected from the 34 MDRs, however, four (12%) were fluoroquinolone/FQ-resistant (pre-XDR).

More recently (2012) and after the GeneXpert was installed at DGH, samples were a combination, mainly of RIF-resistant samples. DST patterns of this group of 50 samples is shown on the last column in **Table 6.** Every attempt has been made by QMRL to avoid and/or limit selection bias, as funding was/is available to perform culture and DST (if required) on all patients (one sample each) sent to DGH Pathology for TB investigation. The MDR rate in this group is higher (82%) compared to samples from 2011 and earlier detected by conventional DST. Moreover, XDR-TB was found in four (10%) out of the 41 MDRs detected, and two (5%) were pre-XDR. More information needs to be obtained on whether most of these samples are from DR-TB suspects or not. There was most likely a selection bias with rifampicin-resistant samples sent to QMRL. Most patients from 2008-2011 were DR suspects.

Table 6. DST patterns of DGH specimens done in QMRL, 2010-2012

DST pattern	2010 (n=40)	2011 (n=20)	TOTAL: `10-`11 (n=60)	2012 (n=50)
Susceptible	11 (27.5%)	5 (25%)	16 (27%)	6 (12%)
Mono-resistant	1 (2.5%):R-res	1 (5%)	2 (3%)	0
Poly-resistant	6 (15%):S/H	2 (10%)	8 (13%)	3 (6%)
MDR	**22 (55%)**	**12 (60%)**	**34 (57%)**	41 (82%)
FQ- resistant	*4*	*0*	*4 (12%)*	*2 (5%)*
XDR	*0*	*0*	*0*	*4 (10%)*

According to the laboratory register for GeneXpert in Daru Hospital, testing started in May 2012, 178 tests had been done, with 93 Rif-sensitive, 51 Rif-resistant, 11 with error and 23 without result. Since the results of GeneXpert had not been incorporated in the BMU register, it was not possible to assess how representative those tested by GeneXpert were

among the hospital's enrolled TB patients, but since the number tested was quite high, 178 in 6-7 months (average of 30 per month), these data could provide very useful information.

Recommendations:

To NDOH:

- To prioritize the timely and adequate implementation of DRS to assess the magnitude of DR-TB in Papua New Guinea;
- To ensure the correct registration type of patients being examined for DR-TB to obtain group-specific resistant rates that will inform policy for case finding; and
- To closely supervise all aspects of the DRS, especially enrolment and patient classification.

D. Political commitment

Findings:

In 2011, the NTP put together the National Strategic Plan for TB Control in Papua New Guinea[11] with an estimated budget of PGK88 million (USD44 million) for five years. Of this amount, allocation for PMDT was based on a target to treat 250 patients.

Government of Papua New Guinea

The Government of Papua New Guinea has been contributing significantly to the procurement of drugs for TB and MDR-TB in the country. This year, 2012, 60% of the latest first-line anti-TB drug (FLD) procurement came from the Government amounting to USD566 486 (compared to GF amount of USD425 989 for the remaining 40% of FLDs), 100% of pediatric drugs amounting to USD140 121, and 100% of SLDs amounting to USD540 227. For 2013, the Government has recently approved the budget of PGK8 million for 100% of FLDs, LD and laboratory supplies, and PGK2 million for TB control operations.

Global Fund

The Global Fund Round 6 (2007-2012) has provided USD14 Million since 2007 for TB, including USD140 000 as partial support to DRS. No other allocation is made for MDR-TB in the GF budget.

R6 was originally set to end in October 2012, however, pending results of an audit in 2011, major activities were suspended. Thereafter, the responsibility of grant principal recipient was turned over from NDOH to World Vision International (WVI), and activities resumed in 2012. Hence, the current period (October 2012-March 2013) is a six-month extension of the R6.

AusAID

AusAID is providing PMDT support for the Western province through manpower (a Medical Doctor plus another one, and a provincial TB Officer), DRS, case finding (GeneXpert and biochemistry equipment in DGH, culture and DST to QMRL), case holding activities, drugs, and infection control (masks, N95, consultancy). AusAID also commits to provide drugs for XDR-TB patients from any part of PNG.

World Health Organization

WHO has provided technical support in PMDT particularly in the development of national guidelines, DRS, training of trainers, drafting of PMDT training modules, forecasting of SLDs, and in recording and reporting.

Challenges:

1. The national TB strategic plan states the cost of the plan, from which the programme has identified a shortfall.
2. The Global Fund put on hold major disbursements to Papua New Guinea in 2011 pending results of an audit. This greatly affected the country's accomplishments, as all activities

[11] National Strategic Plan for Tuberculosis Control in Papua New Guinea: 2011-2015, Government of Papua New Guinea

had to be halted, such as, training on the use of pediatric FDCs, procurement of FLDs, expansion of DOTS to provinces, etc.

3. The NDOH hardly has experience in large-scale procurements, and there are bottlenecks in the procurement process including the release of funds from the Government of Papua New Guinea contributing to the delays in the implementation of services in the country.

Annex 8 is an assessment of the effectiveness of the partners' inputs to TB and MDR-TB control in Papua New Guinea and of the contributions of investments made for TB/ MDR-TB control on health systems strengthening.

Recommendations:
The NTP to:

- urgently develop a smooth transition plan as GF support ends in March 2013;
- consider undertaking a gap analysis including a plan for MDR-TB scale up to establish the shortfall in the comprehensive budget for TB and MDR-TB control;
- revisit targets for DR-TB as soon as the DRS results are out and adjust accordingly; and
- consider other sources of funding, but ensuring to embark only on sustainable activities.

E. PMDT Programme management, human resource, organization and coordination (partnerships)

1. PMDT Programme management

Human Resource capacity
HR for PMDT
The PMDT Focal Person at NDOH is newly appointed (March 2012)[12] replacing a previous NDOH Coordinator who has been tasked with many other matters. However, the current Focal Point also functions as one of the three DOTS Regional Medical Officers and is responsible for at least one region in the country for monitoring and supervision. Hence, there is no fulltime staff for PMDT. The Senior TB Physician in PMGH is the other PMDT Focal Person. Currently, it appears that PMDT implementation is being steered by the PMDT Core Team. This team is officially composed of the NTP Program Manager, two PMDT Focal Points (NDOH and PMGH), CPHL Director, NDOH Manager of Medical Supplies, Procurement and Distribution and the WHO Medical Officer. The team has been actively and regularly meeting this year to discuss PMDT-related concerns, such as, the DRS, SLD procurement, country training modules, etc. At the moment, the WHO Medical Officer facilitates the collection of data ad hoc from the treatment centers through email. There are no policies in place yet for decentralization, and other components of the framework, such as, SLD management, M&E, and recording and reporting, infection control.

HR for DOTS:
At the national level, crucial posts for DOTS in NDOH, namely, those of the Central PSM Officer and Central M&E Officer exist. This is crucial in light of the ending of the GF grant in March 2013. Currently these posts are filled with NDOH-hired people. However, in reality, the work related to these two posts is being performed by JTAI in support of NDOH through GF. There appears to be no clear plans of integrating and mainstreaming the work done by partners in support of NDOH to NDOH itself. Another important post at the central level is that of a Senior Regional Coordinator which has been vacant for several years. Because of these vacancies, central leadership for basic DOTS is rather weak.

At the provincial level, only five out of the 20 provinces have established TB/Leprosy Officer positions (NCD, Milne Bay, Eastern Highland, Morobe, and Western Province), however, one is vacant. The remaining 75% of provinces have no focal person for TB. The responsibility for TB in the provinces has been taken up by GF-supported provincial PSM and M&E staff through JTAI whose contracts will end together with the termination date of the grant (March 2013).

[12] Minutes of Meeting, MoM 12 Mar 2012, WHO Conference Room

Extension is being negotiated at the moment; however, there is no certainty. And should the grant be extended for a few months, the issue of sustainability remains. The responsibility of TB will be left to the Provincial Disease Control Officer (PDCO) who is handling many other programmes.

2. Challenges

Human resource capacity, both quantity and quality, appears to be a common concern in all areas of the TB Programme. The following concerns were shared at all levels: insufficient number of posts; vacancies not filled; absenteeism; travels and leave without ensuring the continuity of routine programme functions and technical capacity of staff. This markedly reduces the effectiveness of quality services and hampers the momentum in implementation, planning, monitoring and supervision, etc.. For example, a complaint from the treatment center is that in the laboratory, there is only one staff who does the Xpert MTB/RIF. When she is out of CPHL for training, or on leave, either the test is not done or postponed to the time when the person is back. The same is true on the programme side.

3. Organization and coordination (partnerships)

There is huge dependence on project-supported partners for critical functions with no plans to mainstream these into the NTP for sustainability reasons. Currently, World Vision, being the Principal Recipient of the GF Grant, efficiently provides the administrative function. It has successfully facilitated the expansion of DOTS to a nationwide scale expanding from nine provinces to 20 provinces trained and implementing DOTS. Together with other partners like WHO, etc., it ably facilitates meetings and trainings to ensure that targets are met. Previous to its being PR, WV was a sub-recipient of NDOH, then PR, which hired provincial and district staff for Advocacy, Social Mobilization and Communications (ACSM) whose contracts have ended or are ending this December 2012. Concurrently, JTAI as an SR of the GF project, has been providing an enormous support to NDOH in PSM and M&E, two crucial components of TB control, with a central office, and two people hired in each province (PSM/M&E Officer, driver) whose contracts end with the GF grant termination in March 2013. Technical assistance is being provided continuously by WHO Country Office, putting in place the PMDT Guidelines, PMDT Training Modules, making possible the Training of Trainers in 2011, updating the TB protocol, collecting data and mediating technical assistance. The focal point for major projects like the DRS is the WHO Medical Officer who provides both technical and administrative support including coordinating and organizing meetings and trainings together with the PR.

Outside the NTP, Xpert is being used for detection of TB among job applicants and employees. There is evidence suggesting some private organizations purchasing GeneXpert instruments with their own funds. It is thought that some private companies may have a good working relationship with the Government of Papua New Guinea and NDOH, and refer MDR-TB cases directly to the NTP for follow-up and treatment. However, since there is no governance for the purchase and operation of TB diagnostics instruments within Papua New Guinea, private organizations are not required and may not report or treat MDR-TB patients that they diagnose.

Recommendations:

a) PMDT Programme Management

- Strengthen DOTS from the central, to the provincial, district and facility levels in all the basic DOTS elements case finding, treatment, drug management and recording and reporting;
- Central PMDT Core Team to decide on, and support a) a model of decentralized care of MDR patients after release from hospital, b) CPHL strengthening in light of the required culture and DST capacity in the country, c) setting up SLD drug management, iv) recording and reporting, and v) supportive monitoring and supervision; and
- Seek international technical assistance on specialized areas, such as, PMDT Recording and Reporting, including on-site training.

b) Human Resource

- For the central level:
  - urgently fill all existing positions throughout the TB Programme especially the Senior Medical Officer post in the central unit;
  - open a fulltime PMDT Central Manager post to work closely under the direction of the NTP Manger and advice of the Central PMDT Core Team;
  - facilitate the capacity building of the Central NDOH PSM and M&E Officers by the JTAI Central PSM and M&E Officers while they are still on board under GF, and draft a feasible transition plan in time for March 2013.
- At the provincial level, continue advocacy to create TB/Leprosy Officer posts in the 15 provinces with no such posts.
- NTP to consider implementing HR policies to:
  - manage staff leaves and trainings, meetings through scheduling and arranging replacements;
  - manage staff attendance - daily check by supervisor tasked to monitor.
  - manage staff performance with motivational approaches, e.g., recognition, attendance in trainings on technical matters, as well as on managerial aspects for those tasked to supervise staff
  - do Annual Professional Development Assessments to monitor progress and set goals for the year, and plan career development

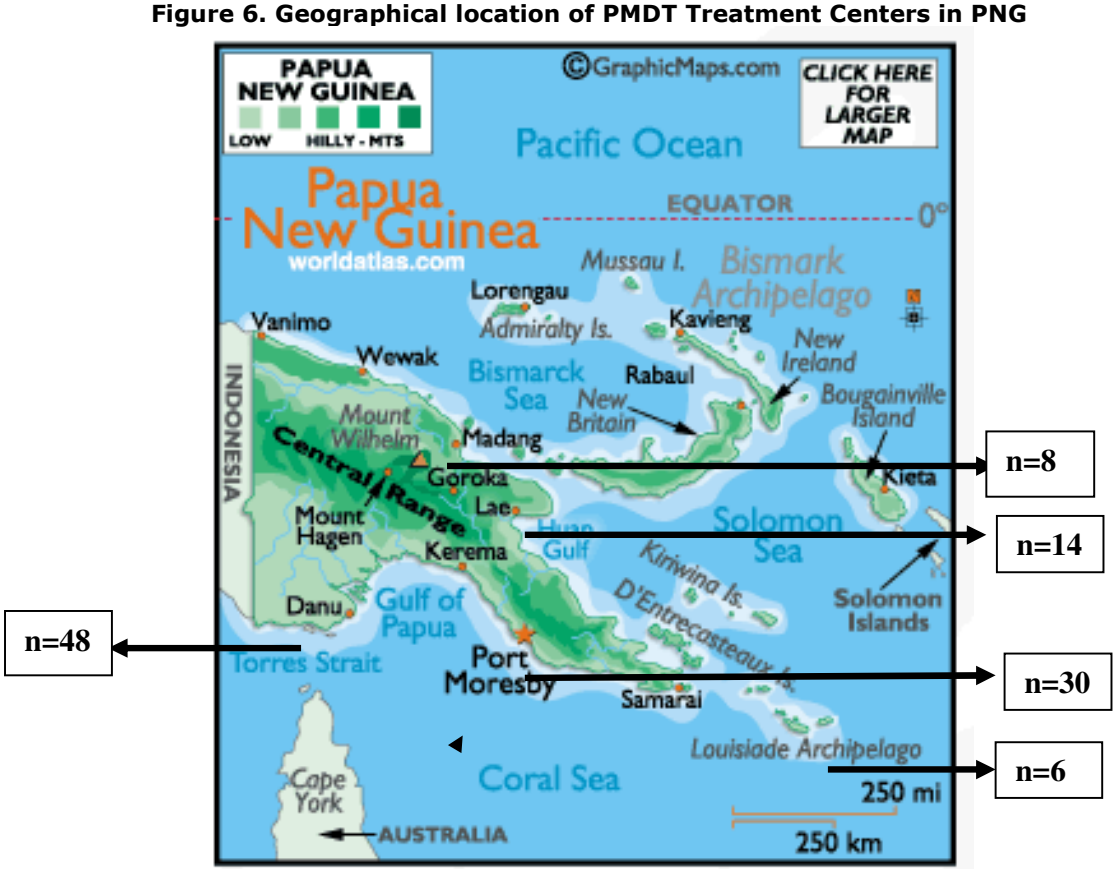
c) Partnerships

- NDOH and partners (WV and JTAI) to urgently develop and implement a smooth transition plan for Coordination, PSM and M&E on DOTS.
- Take advantage of the current review of Public Health Act to create a policy to govern private partners working without restrictions and regulations and integrate them into the existing TB Programme.

PMDT treatment centers

After the PMDT training in November 2011, at least five provinces have been treating MDR-TB in PMDT Treatment Centers: a) Port Moresby General Hospital (PMGH, NCD), b) Daru General Hospital (DGH), c) Angau General Hospital (Lae, Morobe), and d) Madang and e) Milne Bay. The numbers indicated as being treated in the map below are based on a report electronically sent to WHO Country Office by the treatment centers.

Figure 6. Geographical location of PMDT Treatment Centers in PNG



Three MDR-TB sites were visited, PMGH (NCD), Angau Hospital (Morobe), and DGH (W. Province).

PMGH in NCD is a national hospital with a TB ward, a 55-bed MDR Ward (16 MDRs at the time of the visit), and an out-patient TB Clinic which accept patients from any part of Papua New Guinea but mostly from NCD. These wards are managed by a senior TB/MDR-TB physician who has been treating MDR-TB since 1995. He attended the 2011 PMDT Training where he also served as a resource person regarding local MDR-TB practices. He is assisted by Registrars (MDs), nurses and other paramedical staff. The MDR Ward is managed by three nursing officers, with one designated to PMDT who was very knowledgeable on the patients Angau Hospital in Lae, Morobe is a 500-bed government referral hospital for the Momase Region, covering four provinces (Morobe, Madang, East Sepik and Sanduan). It has three TB wards: TB (male) with 16 beds (full during the visit), TB (female and children) with 14 beds (no occupancy), and MDR with 10 beds (7 occupied), a TB out-patient clinic, and performs TB microscopy within its hospital laboratory. Staff at the TB and MDR-TB wards is commonly managed by a Nurse Manager, an Assistant Manager and four CHWs. A TB Medical Officer trained in PMDT in November 2011, and a Health Extension Officer (HEO), in turn trained by the MD, are in charge of clinical patient management.

DGH covers South Fly District in the Western Province: There is one doctor with special training in TB and MDR-TB responsible for the clinical management. A medical officer is being recruited to support him. The TB team including the Provincial TB Coordinator and staff involved in outreach activities ensures follow-up of the patient after discharge.

The TB ward consists of 30 beds divided in four rooms, with 18 patients at the time of the visit. The first room with 10 beds for sensitive smear-positive TB (four patients at the visit), the second room (10 beds) for MDR patients with negative smear after 1-2 months (nine patients), the third room (six beds) for newly diagnosed smear-positive MDR patients (four patients),

and the fourth room with four beds now occupied by one MDRTB/HIV+ patient. A new TB ward is under construction. The only XDR patient admitted is the only patient in the separate 5-bed isolation ward, smear-negative but with no recent culture result.

F. Case finding strategy

Findings:
According to the National Guidelines for MDR-TB,[3] the following are the criteria for DR-TB suspects: a) all retreatment cases including smear- negatives; b) DOTS non-converters; c) HIV-infected TB patients; and d) symptomatic contacts of DR-TB.

Case finding procedures:
The National Guidelines [3] recommend DR-TB suspects identified at the health centers or provincial hospitals to collect sputum and send this to CPHL together with a Laboratory Request Form. The Guidelines were written at a time when Xpert was not yet available. The procedure was to send sputum to QMRL within 24-48 hours for molecular tests, culture and DST. Results were to be released by QMRL to CPHL by email, then CPHL releases it to the requesting provincial physician by fax within the day; and the latter will release it to the referring BMU.

While culture and DST remain to be done in QMRL, Xpert has already been functional in CPHL and in DGH since April-May 2012. CPHL does Xpert to all specimens it receives from provinces other than the Western Province. Supposedly, specimens are sent to QMRL for culture and DST; however due to lack of funding, specimens have not been sent to QMRL for the last 16 months. DGH on the other hand, has been continuously sending samples to QMRL for culture and DST, and at the same time performs Xpert. Provinces that have actively been sending specimens to CPHL aside from NCD are Morobe, Madang and Milne Bay. Samples are sent through air.

Culture and DST results in QMRL are scanned and emailed to CPHL and DGH. A hard copy of the results is also sent via post. There was a system set up at CPHL (GP Connect) that would automatically send encrypted results to the Director of CPHL. Unfortunately, due to poor internet connection at CPHL, this system was not sustained. It is the responsibility of CPHL to forward the results to the requesting health facility by email, post or telephone.

Conclusions: Preliminary and possibly unrepresentative data from QMRL seem to indicate that MDR rates from DGH and other provinces are similar. Except for Daru, there is no systematic approach to MDR-TB case-finding yet. It is unclear whether MDR-TB sites systematically target MDR-TB suspects for MDR-TB diagnosis. This is partly due to lack of laboratory capacity in Papua New Guinea, lack of funding for outsourcing of DST to the SRL in Brisbane, and communication issues. As a result, there are unacceptable delays and MDR-TB cases diagnosed with Xpert are not properly followed up with DST.

Recommendations:
- The NTP to enforce the policy to confirm Rifampicin-resistance with conventional DST to at least a full DST, including DST to Km and Ofx. Allocate funds for these isolates to be sent to QMRL until CPHL can provide this service;
- Facilities to store samples at 4°C prior to transportation to CPHL. Ideally, transport specimens within 24-48 hours following collection and pack according to IATA guidelines. CPHL to refrigerate these samples on arrival and forward to QMRL within 24-48 hours of receipt; and
- When testing is complete, QMRL to email a scanned image of the results to the Director of CPHL and NTP Manager. QMRL to also send a hard copy in the post, addressed to the CPHL Director. CPHL to notify the requesting physician of the result.

G. Laboratory aspects

Findings:
Lab network structure: CPHL is the National TB Reference Laboratory (NRL) and is located within the grounds of the PMGH. It is managed by an OIC, and three fulltime TB microscopists, all trained in microscopy. One was trained in culture and DST; two were trained in GeneXpert but only one routinely does the procedure.

CPHL performs routine TB microscopy. Because there is no proper BSL3 facility, CPHL does not yet perform culture and DST. GeneXpert has been the main diagnostic test used since April 2012. CPHL receives regular monitoring and supervision from its supranational laboratory (SRL), the QMRL in Brisbane, Australia.

a) Microscopy:
CPHL performs routine microscopy for hospitalized patients in PMGH, as well as for the out-patients in the TB Clinic, and other health centers without a functioning SMC.

Infrastructure
Based on the most recent figures available (November 2012), there are 171 laboratories throughout Papua New Guinea, 132 of which are functioning. Unfortunately, this number also includes malaria laboratories, so it is unclear whether the 132 functioning laboratories are for both TB and malaria combined or 132 TB SMCs in total. In July 2011, Papua New Guinea was reported to have 125 functional SMC's established throughout the country. The figures obtained in this mission are rather conflicting. So far, the most accurate data available was from January 2010 **(Annex 9)** which shows 112 SMCs for 6.290M population which gives an SMC: population ratio of 1:56,164 people. However, the range of this ratio is 1:23,889 in Milne Bay to 1: 417,428 in East Sepik implying overburdening in some SMCs and underutilization in others. This imbalanced access was initially thought to be a major reasons for a high proportion of smear not done among suspects and cases; however, this did not seem to the case in all the provinces. East Sepik with a ratio of 1:417,428 had a SND proportion of 58%, while West Sepik with 1:38,000 ratio had a very high SND rate (75%). However, because the data used for the number of SMCs is not updated, these conclusion needs to be validated.

In Papua New Guinea, TB microscopy services are integrated in general laboratory diagnostic services, which make the design of a designated TB microscopy laboratory difficult. Regardless, in integrated laboratories, a separate area must be reserved for TB microscopy with good ventilation, or properly maintained BSC's for staff safety, when culture and DST will be performed.

External Quality Assurance (EQA)
The NTRL coordinates EQA and provides training to all SMCs. Each quarter, every SMC is required to send a quarterly workload report, a pre-determined number of slides for blinded re-checking and a completed copy of the blinded rechecking data sheet to CPHL.
Quarterly reports are a valuable tool for assessing need and demand. Rechecking programmes are intended to assess overall laboratory performance. Based on the findings of the blinded re-checking, CPHL is required to provide feedback to the health facilities regarding the quality of sputum microscopy. As of November 2012, CPHL was almost 12 months behind in assessing and returning the quarterly reports to the SMC's.

In terms of EQA, there was no recent data available on the number of SMCs strengthened by EQA. Insufficient staff, slow fund flow and irregular supervision from CPHL are the main barriers to obtaining reliable data, and an efficient EQA system for laboratories.

Human resource and workload:
As not all data were available, looking at the workload statistics for three SMC's visited (CPHL, DGH, and Angau Hosp lab), the staff-to-work ratio was acceptable (20 to 25 slides/day/

microscopist); however, this does not take into account additional responsibilities **(Annex 10)**. As mentioned, CPHL has a 12-month backlog of feedback reports to SMCs.
In addition. as more services are being conducted in CPHL, such as, Xpert, culture and DST (soon), microscopy examination may be compromised.

Reagents, equipment and maintenance:
Stop TB Diagnostic Kits (GDF) - Microscope/Equipment/Consumable are available at the Area Medical Stores and are distributed to SMCs throughout Papua New Guinea, with the exception of CPHL and Angau Hospital, as they prepare their own staining reagents. CPHL has 700 GeneXpert MTB/RIF assays that expired on 2 December 2012.

Most microscopes are functional and in good working order, although long overdue for servicing and maintenance. Often spare parts and spare light bulbs are not available at the SMCs. Therefore, if the microscope is faulty or blows a light bulb, the TB microscopy service is often interrupted until such time when replacement parts arrive. This may not be a major issue or cause long delays in major facilities; however, in remote areas this may cause very lengthy delays.

The BSCs at CPHL were due for servicing in May 2012. The BSC used to prepare smears from sputum samples in Angau Hospital Laboratory was last serviced in 2003.

Sputum collection
In Papua New Guinea, there are different sputum containers in use. The sputum cups provided by GDF are acceptable, however not ideal as they are small, with no provision for easy labeling and the screw top does not provide a tight enough seal. Most often in the large facilities, the yellow-top transparent sputum containers are used. Another finding is the high frequency of salivary specimens documented in the Laboratory Registers. In one laboratory visited, almost 50% of the patients specimens were salivary, with no feedback made to the clinics for recollection or any advice.

Turn-around time (TAT) and Recording and Reporting
Currently the TAT varies from three days to two weeks. All three sites, DGH, Angau and CPHL, at some stage experienced long delays, sometimes up to two weeks. Generally, the TB laboratory Registers were well-maintained, with comments regarding the quality of the specimen.

b) Culture and DST
It is anticipated that culture and DST will soon be available in Papua New Guinea as it is expected that the BSL3 laboratory at CPHL will commence construction in the Q1 Quarter of 2013. This issue has been discussed since 2008; however it was only on 13 November 2012 when the first payment to the contractor was made. As the physical infrastructure soon rises, a significant adjustment in staffing structure with highly trained and competent full-time staff needs to be prepared to be able to perform and maintain this service, while not compromising existing services. Likewise, microscopy should become a separate unit from culture and DST **(Annex 12).**

Sputum specimens from MDR-TB suspects used to be sent from CPHL to the QMRL for culture and DST. As funding has been limited, no sputum specimens have been received at QMRL from CPHL since August 2011. However, the Western Province, DGH has been sending specimens as part of the AusAID-funded TB Laboratory Support Programme.

c) GeneXpert
The GeneXpert MTB/RIF has been fully functional in CPHL since April 2012 and in DGH in May 2012. A third and fourth GeneXpert instrument will be installed at Angau Hospital in Lae District, Morobe Province and Madang TB Clinic, Madang Province. The GeneXpert instruments have been specifically placed at these locations to participate in the DRS. Another machine was planned in Kokopo Province as stated in the Country Guidelines. A zoning mechanism is in place that designates which laboratory each province will send samples to.

Annex 11 shows the GeneXpert results done in CPHL and DGH. Initially, this assay was used to diagnose individuals suspected of having MDR-TB or HIV-associated TB. However, since there was a surplus of expiring kits at CPHL, Xpert has been performed on all patients with a smear-positive specimen regardless of whether they are for diagnosis or follow-up. As high rates of MDR-TB are widely documented in the South Fly District, all smear-positive patients in DGH are processed through the GeneXpert for diagnosis. Follow-up specimens are sent to QMRL for culture. In PMGH TB Ward, a patient's chart showed evidence that Xpert is done multiple times while on treatment.

Rapid recording and reporting of Xpert results and access to appropriate treatment must be established to provide patients with the benefit of an early diagnosis. The TB05 (TB Laboratory Form Request for Sputum Examination) has been adapted at both DGH (TB05A) and CPHL (Form 03) to make provisions for requesting and reporting Xpert MTB/RIF results.

Turn around time (TAT) for Xpert
In DGH, a sample for Xpert is being requested after microscopy shows smear-positive results. This causes delay in identifying MDR cases, considering there is already delay in microscopy per se. If we were looking specifically at GeneXpert only, the TAT from the moment the specimen arrives until the result is returned should be between 24-48 hours. which is likely happening in DGH. CPHL has a long delay, and even longer for samples sent from other Provinces. It could easily take up to two weeks in some circumstances.

Recommendations:

a) Laboratory Network

CPHL to strengthen its EQA for microscopy:

- Urgently complete TB microscopy EQA activities for 2011 and 2012, keep the monitoring up-to-date and provide refresher courses for poor performing technicians;
- Monitor which SMCs are functioning to obtain accurate information on the SMC: population ratio;
- Consider distributing the SMC workload throughout PNG such that the SMC population ratio is more or less 1:50,000 in all areas, thereby, avoiding overburdening in some SMCs, and underutilization in others;
- Conduct regular supervision to SMCs; provide on-site support, and timely quarterly feedback to the SMCs;
- Consider decentralising EQA activities to the provinces. Each province to support own SMCs at district level and CPHL to support SMCs only at provincial level; and
- CPHL to consider creating a separate TB Reference Unit for culture and DST since service delivery with routine microscopy is not a function of a reference laboratory **(Annex 12)**.

b) Microscopy:

- Specifically designate staff to TB sputum microscopy, and ideally where possible, have a specific TB SMC at a health care facility, independent of other Pathology services. This will ensure TB microscopy is prioritised and not compromised;
- To assess the laboratory layout for all SMC's in line with the standard laboratory design, with particular attention to areas used for smear preparation;
- The NTP to look into providing funding for microscope equipment, and travel allowance for a microscope technician to travel to provinces for regular maintenance and servicing of microscopes; BSCs in CPHL and Angau to be urgently serviced;
- Aim to reduce salivary specimens. Sputum collection points to give clear instructions on procedure to obtain sputum. Salivary specimens are to be rejected and a recollection requested;
- NRL to recommend the use of sputum collection containers that are break-resistant, transparent plastic, with a wide mouth, a screw cap to avoid leaks and aerosol formation, and have provisions for labeling, ideally, with a capacity of at least 20 ml; and
- Investigate the long TAT for microscopy in certain instances (up to two weeks) and aim to shorten this to 24-48 hours.

c) Culture and DST:

- Do conventional culture and DST rifampicin-resistant TB specimens confirmed by Xpert MTB/RIF (in QMRL for the time being);
- Identify funding for culture and DST in QMRL;
- CPHL to equip itself for the establishment of a BSL3 laboratory:
  - Consider starting with solid culture, prior to liquid culture, to monitor contamination rates;
  - Assess current workload in CPHL, prior to commencing culture and DST, and recruit and train staff for these additional services; and
  - Arrange continuous maintenance contracts and perform quality control on all major pieces of equipment, and ensure a continual production of quality controlled decontaminating reagents and LJ media.

d) GeneXpert:

- Use the original sputum sample of smear-positive patients for GeneXpert rather than recollecting, causing delay;
- Contact Xpert MTB/RIF manufacturer (Cepheid) and consider to extend expiration date of expiring/expired kit or swap with later expiring ones;
- Use only GeneXpert for diagnosis and not for monitor treatment response; and
- Consider a rotating roster system in CPHL to ensure a constant and continued provision of services for all procedures, including Xpert and microscopy.

H. Treatment strategy

Regimen
The Country Guidelines [3] recommends a standardized regimen consisting of Z Km Lfx Eto and Cs; Cm to replace Km in Km-resistance, and PAS to replace Cs in case of intolerance.

In PMGH, regimens of patients in the Ward generally consisted of Z Cm Ofx Eto and Cs. Group 5 drugs were used for non-converters. At least one patient was still positive at month 13 and was on Clofazimine; another non-converter and HIV+ had recently died and was put on Coamoxiclav. Underdosage of Cm, Eto, and Cs was noted in at least three patients weighing >50 kg.

In Angau, the regimen used was the same as that in PMGH. Duration of injectable is arbitrary with no clarity on what is in the policy; in some, the injectable was given regardless of the time to conversion. The duration of the entire treatment was given for 18 months, again with no reference to the time to conversion; hence, if a patient converted on the 8th month, treatment would be stopped at the 18th month, thereby, giving only 10 months of the continuation phase instead of the recommended 18 months. Dosages were not checked due to time constraints. All oral drugs including ofloxacin were given twice daily, except for pyrazinamide.

According to the PMDT register in Daru, in 2011 most MDR patients received CmOfxCsEto, some also Z, only one Ethambutol (E), some only CmOfxCsZ. In 2012, almost all received CmOfxCs EZ, at the end of the year some also PAS and/or Etionamide (Eto). The reason for not giving Eto in 2012 was that the DST result showed resistance to Eto in most patients and colleagues in Queensland strongly advised to omit the drug. Checking of records shows that dosages were correct.

Model of care
The Country Guidelines state a mixed model of care with two months of hospitalization followed by decentralization to a trained health center nearest the patient's home.
The mission observed that the model of care is still setting specific and modalities for ambulatory care limited.

Patients in both PMGH and Angau were hospitalized for $\geq$8-10 months as long smear-positive. There are patients who prefer not to be discharged, even if negative.

No decentralization to health centers is taking place at this time as no training of BMUs has been conducted yet. Instead, patients are sent home with a 2-4 week supply of drugs with no strict instructions to take these with a treatment supporter. Patients were advised to return to the hospital every 2-4 weeks for replenishment of the drug supply, and ad hoc for adverse reactions and/or comorbidity or complication. The senior TB physician in PMGH realizes the need to reduce patient load in the hospital starting with their Category 2 patients who come daily for injection. However, injectables will have to be given five times per week rather than six times as the BMUs are open only from Monday to Friday. It may be difficult to recruit treatment supporters without incentives or enablers. The NCD thinks that before MDR-TB patients are endorsed to the urban clinics, they need to be equipped first, through training and infection control measures. According to the staff in Angau, the belief at the moment is that MDR-TB is only for hospitals and not for BMUs. The programme is waiting for the results of the DRS to determine the magnitude of the drug-resistant TB problem in Papua New Guinea before they would make a policy to involve BMUs in MDR care.

MDR-TB patients in DGH are usually released after two negative smears taken one month apart, provided that DOT can be ensured. Most of the patients stay in Daru Island but the strong cadre of treatment supporters do not attend to them (they have not been trained to provide MDR-TB treatment yet and are still hesitant to take on MDR-TB patients, although one of them is a cured MDR-TB patient). Patients in Daru come daily to the ambulatory part of the TB ward. Some of the 40 MDR-TB patients going there daily were still smear-positive.
The waiting area is basically inside the building and quite crowded, although mostly TB patients. MDR-TB patients from the mainland communities can go back to their community after discharge if there is facility-based DOT or a treatment supporter in one of the seven villages that were trained under the AUSAID supported project. Currently 17 MDR patients were on treatment in seven villages outside Daru Island. The infection control situation in Daru hospital will improve significantly once the new MDR-TB ward has been opened (2013).

DOT, adherence, social support
It is worth mentioning that Angau TB Clinic engages volunteers, such as, a priest (in 7th street) who has experience partnering with an NGO for DOT, and BMUs. DOT is required during the first two weeks of DOTS, after which supervised therapy is thrice weekly (M-W-F).

For MDR, the nurses, or the CHWs in the ward administer the injection and provide the DOT for the oral drugs. Upon discharge, DOT is continued at home on a self-administered basis. If patients fail to come on their expected visit or if they interrupt treatment, there is no mechanism in place to follow them up. Although anti-TB drugs are free, no incentives or enablers are provided to patients.

In DGH, there is no food support apart for hospitalized patients. Transport to and from hospital can be paid by the TB project. Preliminary results for Daru show very low defaulter rates (hardly any) and very low fatality rates, with only two deaths among forty four newly diagnosed MDR-TB patients until October (although documentation is weak as explained under recording and reporting).

Monitoring response to treatment
In PMGH, smear was claimed to be done monthly, while in Angau Hospital, it appeared that smear microscopy was done quarterly. No culture is requested while on treatment.
The reason given during the visit was that the license to pack infectious material in Angau microscopy laboratory had expired and needed to be renewed. WVI has scheduled a training for all provinces on packaging. However, it was learned later that two batches of specimens were transported to CPHL in May and Jun 2012 supposedly for culture and DST (CPHL did Xpert on these). In DGH, smear controls were supposedly done every month, but could not be verified since data were not entered in the PMDT Register and treatment cards were not in use. Culture controls are sent to QMRL, but it was not clear how frequently as results could not be verified. There was long delay (4-10 weeks) in getting culture results.

Side-effects and follow up management

Common side effects are joint pains, hearing loss. Less common are vomiting and hallucinations. Ancillary drugs are provided to patients, such as, anti-emetics, pain relievers, etc., as needed free of charge even after discharge. So far, ADRs have not been noted to be the cause for default; however, since documentation is lacking, the magnitude of default and other outcomes, especially in PMGH, is unknown. In DGH, the lab equipment has recently been supplied to ensure all required tests except TSH are done. Side effect was also not a reason for default but could make it necessary to modify the regimen.

Conclusions: DOT seems strictly observed in the wards; however, at home, drugs appear to be largely self-administered, except for Western Province, where ambulatory treatment is supervised by either the hospital OPD or AID posts and treatment supporters on the mainland. Decentralization is not yet practiced in the other MDR-TB treatment sites visited and mechanisms to trace interrupters and defaulters are weak, except in Western Province. Compliance to guidelines is weak, e.g. regimen, dosages, and duration, except for Daru. Potential XDR patients are managed inadequately.

Recommendations:

1. Comply with the agreed standard regimen in the Country Guidelines with Km as the injectable of choice unless otherwise indicated; Cm is three times more expensive and has no documented superiority over Km.[13] Lfx is the recommended fluoroquinolone of choice, and is 20% cheaper than Ofx; [14]
2. Do not rely on DST results for Cs and PAS provided by QMRL as the international consensus is that these data should not be used for clinical decision making;
3. Maintain Ethionamide in the standardized regimen even if DST shows drug resistance; [13]
4. Conduct training and/or re-training of physicians and nurses in PMDT treatment centers for management according to Country Guidelines:
    a. comply with the recommended dosages and minimum duration of treatment to diminish chances of becoming XDR;
    b. revise dosing of ofx to once daily instead of twice a day to maximize the concentration effect of the drug;
    c. consider XDR or pre-XDR (resistant to EITHER SL injectable OR FQ) among non-converters and add at least two group 5 drugs to a failing regimen;
    d. ensure supervision of treatment all throughout treatment;
    e. put in place a mechanism to trace interrupters;
    f. monitor treatment response not just by smear but also by culture; and
    g. discharged patients to see PMDT physicians on a monthly basis until expertise to manage MDR-TB has been acquired. In Southfly, a site-specific arrangement can be done.
5. MDR PMDT Core Team to discuss decentralization from hospital to trained peripheral centers and/or community treatment supporters to ensure continued DOT/supervised therapy till end of treatment by a non-family member.

Data on patient enrollment

Prior to the visit, data on patient enrollment were sent to the team. In PMGH and Angau, data could not be reconciled since the records were not in order. Records were however, orderly in the PMGH TB MDR Ward.

Data review in PMGH TB Clinic, showed nine patients in the new PMDT Register entered from January to July 2012; however the entries were incomplete. Patients were also entered repeatedly (each hospitalization or after default, maybe). Attempts were made to trace data in the patients' charts, however, these were mostly not in the Clinic. No PMDT Treatment Cards were used. Given the time constraints, it was not possible to determine exactly the number of enrolled patients. In the PMGH MDR Ward, there was no PMDT Register, but the Admission Book was orderly with 11 patients enrolled for treatment from September 2011 to

[13] Guidelines for the programmatic management of drug-resistant TB, 2011 update, World Health Organization –Geneva. WHO/HTM/TB/2011.6

[14] http://www.stoptb.org/gdf/drugsupply/pc2.asp?CLevel=2&CParent=4 accessed on 13 Dec 2012

November 2012: six males, five females, age range: 18-56 years, all from NCD. Not all were confirmed MDR based on the available data checked.

In Angau Hospital, the PMDT Register showed 14 patients started on treatment, and two DR-TB suspects awaiting treatment; however, these included those enrolled from April 2009 to June 2012: eight males, six females; age range: 22-60 years, mostly from Morobe (Lae and other districts). Only eight had confirmation of MDR or R-resistance; results could not be checked in the others.

In Daru, according to preliminary data from the PMDT Register (including MDR patients from 2011 onwards) compared with the Laboratory register for GeneXpert (since May 2012), and including 33 MDR cases treated and handed over from Australia, the number of MDR-TB cases increased from 31 in the period 2005-2009, to 40 in 2010 alone, 23 in 2011 and so far, 56 in 2012 (until end November). MDR patients registered in Daru increased from five in 2009 to 23 in 2010, 13 in 2011, and so far 56 in 2012. Clearly, the introduction of Xpert has led to a sharp increase of MDR-TB case detection, and high R-resistance rates in new patients show that all pulmonary TB patients need to be tested with Xpert. There is however, an urgent need to analyse data from the BMU register to justify this.

Treatment outcome

In PMGH, no cohort analysis has been done. More time is needed to make a review of the data due to lack of organization of charts. In Angau, out of the 14 patients started on treatment, seven had treatment outcomes, according to the staff: four treatment completed, two transferred out to Port Moresby General Hospital (one completed already), and one died from a non-TB cause (OB-Gyne case). There was no default. However, these outcomes need to be reviewed and validated.

In Daru, cohort analysis was hampered by the absence of one solid recording and reporting system. However, data are available in different systems and laptops. A time-consuming analysis showed that all 16 MDR cases registered in 2011 were still on treatment. Among 56 registered in 2012, so far, 12 were still in the hospital, 40 were followed up as outpatients, one had been transferred to Port Moresby and three had died (including one who died shortly after treatment start). In fact these results are very promising, as patients arrive in very poor condition, but respond well and the model of care prevents defaulting, thus far.

Conclusion:

Reliable data on enrolment and treatment outcomes are available, but not easily available. These data are often kept in laptops of individual staff and in non standardized files. Recording and reporting needs to be strengthened urgently, making use of standardized WHO MDR-TB reporting systems.

Recommendation:

- Request technical assistance on Recording and Reporting and conduct training to MDs, nurses and all staff involved; and
- Analyse MDR and Rif-resistance rates among new patients using BMU patient data.

I. Drug management

Findings:

The NDOH is assisted by a Global Fund-supported partner, JTAI, for both procurement and supply management (PSM) of FLDs and M & E for DOTS. PSM covers forecasting, procurement, storage and distribution. It is not part of JTAI's mandate to manage SLDs; however, informally, the central focal point for FLDs also keeps an inventory of SLDs.

First line drug management

For TB drugs in Western province the M&E officer (also taking care of drug management) is placed in Kiunga (North Fly) since April 2012, covering also Middle Fly, but not South Fly. The staff of the TB team in Daru hospital, therefore manages the supply of TB drugs for South Fly (FLDs and SLDs). In Daru hospital TB drugs, both FLDs and SLDs had been regularly supplied during the last year. The district quarterly TB reporting form includes a section for drug request, stating current stocks. Daru has also provided TB drugs to Middle Fly since transport from Port Moresby has been a problem. The TB drug request is supposed to be based on the number of cases, but it seems that distribution is usually based on previous consumption.

FDCs have been gradually introduced in Western province since October 2011 as staff have been trained. Still a few health centers have not started FDCs but the last staff were trained in October 2012, hence, the remaining facilities will soon start.

a) Selection and use:

In the Country Guidelines for PMDT, [3] the injectable of choice is Km, with a provision for 3% of Km-resistant who will be using Cm. However, in the two PMDT sites that were visited, only Cm was used. In the MDR-TB Procurement Request Form and Technical Agreement [15] submitted to the GDF on 11 July 2012, the order was for Km and none for Cm. There was also no order of PAS. The GDF website shows the big difference in cost of the two injectables: Km 1 g vial is 2.58 USD while Cm 1 g vial is 8 USD. [14]

Quality assurance

FLDs for adult and pediatric patients are now FDCs procured from GDF. The programme has implemented the policy to phase out loose/single drug formulation drugs. However, at the time of the visit in the facilities, there were still, loose FLDs: H, R, Z E and S mostly manufactured in India with unknown quality. SLDs currently in use are likewise manufactured India and China, also with uncertain quality. However, PNG has had its first procurement of SLDs from GDF due for delivery in early 2013.

Loose FLDs and SLDs available at the central warehouse are not in the list of WHO pre-qualified drugs, nor in the SRA (Stringent Regulatory Authority) approved list nor in those eligible via the Expert Review Panel (ERP) process [16] underscoring the fact that these drugs are of unknown quality. However, based on one drug potency test results done on SLDs (Cm, Ofx, and Eto) in June 2011, through the SRL, the drugs were potent.[17] More serial tests are advised to ensure that the drugs are indeed of good quality, short of accepted standards. This becomes moot and academic, however, as the country has decided to obtain drugs from GDF. There is, however, some threat that procurement will shift back to local tender via the public tender system which GDF will not be able to participate since it does not have a local representation.

b) Procurement:

One of the major challenges in drug management is procurement delay. The lead time from receipt of proforma from GDF to payment for **adult FLDs** was six months. Category I kits were delivered in August, making a total lead time of eighth months. This has led to a stock-out of FLDs in the country prior to September. Category II kits currently on stock out in facilities arrived 30 November but are still in customs. **Pediatric drugs** took three months and three weeks for payment which was just made last 11 November, and has led to the current stockout for intensive phase pediatric drugs. Expected delivery is after four months, making the total lead time seven months. The **SLDs** however, took only two months from receipt of pro forma to actual payment. Expected delivery is March 2013, making the total lead time eighth months and three weeks. The following table shows the series of procedures

[15] MDR-TB Procurement form and technical agreement (MTPA), Stop TB Partnership, Global Drug Facility, signed 11 Jul 2012

[16] http://apps.who.int/prequal/ Accessed 13 Dec 2012

[17] Certificate of Analysis: Forensic and Scientific Services, Queensland Government: 27 June 2011

in the procurement process underscoring the long planning needed given the bureaucracy and the inherent lead time from global supply to country procurement.

While the purpose of the table below is to show the lead time in drug procurement, the mission team acknowledges, as pointed out by JTAI, that the GF suspension of disbursement during the shift to a new principal recipient (PR) in 2011 constitutes a more serious cause of delay in the arrival of drugs. The FLD procurement shown below actually refers to the government-funded stock that was supposed to follow the GF-funded stock that should have arrived in the country in June 2012. This obviously did not materialize due to the change of PR and related delay in fund disbursement. The drugs that were scheduled for delivery in June 2012 had just recently arrived the country, resulting in a six-month delay. It should be noted, also, that it was NDOH's first time to handle a large-scale procurement, thereby, needing a longer process along the way.

The demand for pediatric FDCs greatly increased in 2012 as the new provinces had newly trained MDs who had to be told that the drugs were not yet available. This situation was mitigated by the continued use of loose drugs, which has been the typical regimen since up to 2012 except for the major provinces that were trained in the earlier years of the GF grant. Another contributing factor to the disruption of these drugs was the transition away from the GDF grant previously utilized to support pediatric FDC procurement in years 1-4 of the grant, and the consequent lack of follow-up in the wake of the earlier GDF verification mission (ensuring that the discontinuation of the GDF support will be replaced by the engagement of NDOH).

Table 7. Lead time for procurement of FLDs, Pediatric FDCs and SLDs

Drugs	Procedure	Date	Lead time
FLDs	Proforma from GDF (valid till 15 Mar '12)	16 Dec 2011	6 mos (180 das)
	Signing of Certificate of Inexpediency	Jan – May 2012	
	Approval by the Central Supply and Tender Board (CSTB); Signing of the Advice of Pre Commitment Form by Health Sec. then forward to CSTB and signed off by Dept. of Finance and Chair of APC		
	Signing of contract with GDF for FLD procurement	9 Jan 2012	
	Letter of Acceptance sent to GDF (but GDF point person on duty travel)	May-Jun 2012	
	GDF instructed NTP to liaise with GIZ		
	GIZ signs letter of acceptance		
	NDOH Medical Supplies Branch procurement Committee finalized payment request	8 Mar 2012	
	Proforma requested to be extended for 90 more days (valid till 15 Jun '12)	16 Mar 2012	
	Final payment remitted to GDF	16 Jun 2012	
	Delivery of FLDs in PNG	27 Aug 2012	2 mos 11 das
Pediatric drugs	Price quote from GIZ received by NTP	17 Jul 2012	3 mos and 3 weeks
	Request for payment by NTP	18 Jul 2012	
	Follow-up of payment	Oct 2012	
	Payment finalized	11 Nov 2012	
	Estimated delivery	30% Air 5 Apr 2013 70% Sea 17 May 2013	+ 4 mos and 19 das
SLDs	Proforma from IDA	12Jul '12	2 mos and 9 das
	IDA supply contract signed	12 Jul '12	
	Payment received/acknowledged by IDA	21 Sept '12	
	Estimated date of delivery	28 Mar '13	+ 6 mos and 1 wk

The first GDF procurement request [15] for SLDs consists of the following drugs for 310 patients (60 currently enrolled and 250 targeted to be enrolled for 4 quarters): Km for 73%, Ofx for 19%, Lfx for 81%, Eto, Cs and Z for 100%. It is noted that no Cm was ordered.

c) Storage:

Central:

There are five national drugstores (area medical stores/AMS) in PNG operating under the government's national budget. Two of these were visited, the one in NCD and in Lae, Morobe.

Both FLDs and SLDs are centrally stored at the Badili national drugstore. It is a large warehouse with a certain section designated for anti-TB drugs. The warehouse is quite spacious with ceiling fans in continuous operation. No temperature and humidity monitoring was observed. Drugs were arranged in large shelves and needed some order (Cs boxes were in two different shelves). As there was no point person at the time of the visit (coordination issue), there was no inventory list shown at the time of the visit. There was no indication that the first-expiry-first-out principle was not followed. No expired drugs were noted.

The AMS in Morobe does not store drugs for TB, as well as drugs for other centralized programs such as HIV, malaria. It was learned that prior to GF in 2007, it used to store FLDs. With GF funding to renovate the current TB office and drugstore of the province, TB drugs were transferred. There appeared to be a good system in place with orderly documentation.

Provincial:

NCD provincial drug store was not visited. In Morobe, FLDs are kept in the provincial TB office drugstore, near the provincial TB Office, a GF renovated building that houses the TB staff. There are no SLDs stored in this facility. The drugstore is well kept. Individual drugs were well-inventoried. TB drugs were kept in an air-conditioned (AC) room, but maintained at room temperature in the evening.

At the BMUs, drugs are well kept. The TB kits are named per patient and arranged neatly. No inventory was presented at the time of the visit.

PMGH also stores some SLDs not only for its use, but sometimes, for other provinces who call them directly. The inventory at this site lacks updating; the logbook did not show recent receipts and issuances. In Angau Hospital, there was no logbook presented. The quantities were obtained from the Health Extension Officer.

Inventory of FLDs for adult and pediatric patients

Central level:

The following drugs were stored in the central warehouse in Badili: FDCs Category I (288 kits) and II (264 kits), and loose FLDs; R, Z and E (no H), and SLDs: Cm, Km, Eto, Cs, and one group 5 drug, Clofazimine (Cfz). It is noteworthy that: a) there are a few remaining FLD kits (category I and II) at the central warehouse that were noted to be lacking in some facilities visited; and at least 4,200 tabs/caps of Cs that were not in stock in the PMGH TB Clinic, b) Km the injectable of choice in the Country Guidelines, is available but currently not used in the program, albeit of unknown quality; c) Ofx (168,000 tabs) expiring June 2013, although again of unknown quality, is available at a huge quantity that can be used for at least 233 patients until expiry date.

Annex 13 shows the minimum quantity of drugs available at the Central warehouse. No inventory was available during the visit, as the person in-charge of the inventory was apparently uninformed. Assistance in counting the cartons was provided by the warehouse support staff with note only of the minimum number of cartons present; hence, the count is just an estimate and should not be taken as the actual count of the drugs.

There is evidence of selling of FDC kits as disclosed by a patient in PMGH TB Clinic. He bought a week's supply of GDF Category 1 drugs (28 FDCs) from a private pharmacy for PGK400 (USD200). The senior TB physician expressed concern that TB drugs and other drugs stored centrally are being sold to local pharmacies and private doctors.

Provincial level:
In Daru hospital FLDs and SLDs are stored in a room adjacent to the TB communications room. It was not visited. There were no stock outs during recent months of TB drugs.

The NCD drugstore was not visited but according to the TB/Leprosy Officer, there is a stockout of Category 1 and 2 kits in three to four BMUs, and a stockout of pediatric intensive phase (IP) FDCs (HRZE) in majority, if not all, of the BMUs. This was explained that this was brought about by a delayed rollout of pediatric FDCs owing to the suspension of GF disbursement and had been mitigated by the used of loose drugs which had virtually been the regimen up to 2012 for majority of the provinces.

This was not the case in Morobe province, where there were category 1 kits (24) and category 2 kits (12); however, it was expressed that these will soon go on stock-out as these quantities are not sufficient for the entire province. The earlier stock report of the PSM Officer from 14 March to 27 August 2012 showed a stock-out of Category 1 and Category 2 kits, after which in October, 842 category 1 kits, and 24 category 2 kits were received for the province. Like the NCD, there was a stockout of pediatric IP FDCs. Pedia HR FDCs were in stock at 88 boxes. There were stocks of loss drugs: H, R, Z, E and S, and recently expired Rifampicin suspension bottles separated in one box; these were to be disposed of through the TB office.

Hospitals:
In PMGH, there was a stock-out of FDC Cat II (since the previous week), and pediatric IP FDCs. FDC category I kits (15), and loose R, E, and Z tablets were available. There was insufficient time to check the status of FLDs in Angau Hospital.

BMU level:
Mabuduan health center was visited and it had adequate stocks of general drugs since supplies were received in September 2012. TB drugs were kept with other drugs in a separate room, in good order. The kits (Cat I) for the patients on treatment were kept on the desk of the CHW, while three extra Cat I kits were kept in the drug room, expiry date March 2013. In a separate box there were a number of single drugs: Ethambutol 400mg 1300 tabl, expiring 4/2016, Isoniazid 100mg expiring 3/2014, Pyrazinmaid 500mg expiring 5/2013, Rifampicin 150mg 1000 tabl, expiring 11/2014. Pyridoxine 25mg 2000 tabl, expiring 11/2013. All the loose drugs (except some INH and pyridoxine) and the extra kits were brought back to Daru to prevent inadvertent use after expiry date.

In Badili Urban Clinic in NCD, there were Category I kits (21) but no stocks of Category II kits. There were 12 pediatric continuation phase FDCs but no pediatric intensive phase FDCs **(Annex 13)**. There were loose H, R, E and Z with some of the loose R that expired in October 2012.

In Butibum BMU, drugs were just enough for currently enrolled TB patients, but there were no more drugs for any future patient. There was ample stock of loose FLDs: H, R, Z, E and S. **(Annex 13)**

SLDs
Daru Gen Hosp data. There were no stock outs of FLDs and SLDs in recent months.
In PMGH where there were at least nine patients entered in the new PMDT Register at the TB Clinic, there was a stockout of Cs. The same was true for the MDR-TB ward where there were 18 MDR patients on treatment. Other SLDs: Cm, Ofx, and Eto were available at 1.2-3.3 patient months, assuming there were only nine patients using the drugs and that all were on the same regimen. There were Km vials that have apparently not been used.

In Angau Hospital where there were 14 patients put on MDR treatment, all drugs in the standardized regimen were available at 0.87-5.9 patient months assuming that all patients are currently on Cm injection.

Summary of the inventory:
Category II kits and pediatric FDCs for IP are out of stock in most facilities visited; for SLDs, Cs was out of stock in PMGH TB Clinic. It is worth noting that except for the pediatric IP FDCs, both Category II kits and Cs were in stock at the central warehouse. Loose drugs are present in considerable amounts but are not used in view of the policy to use only FDCs.

Table 8. Essential drugs on stock-out level

Essential drug	Level (facility)
Category II kits	Province level (NCD); BMU level: Badili, NCD and Butibum, Morobe Hospital PMGH
Pediatric IP FDCs	Central level (not observed) Provincial level (Morobe) BMU level: Badili, NCD and Butibum, Morobe; Hospital: PMGH
SLD: Cs	PMGH TB Clinic

d) Distribution
From the BMU level, health centers would indicate the drug needs in their quarterly reports. These are submitted to the Provincial PSM Coordinator, and forwarded to the Central PSM Manager/Officer. After reviewing drug needs, only a portion of the declared quantity is sent from central to province as deemed necessary. In Western province SLDs are only used in Daru hospital (South Fly) and Kiunga (North Fly). Middle Fly (Balimo hospital) have sent sputum samples to Daru for testing but no MDR case has yet been diagnosed. The TB team in Daru said they managed to get FLDs and SLDs in time. FLDs are requested from NDOH with the quarterly TB report, while SLDs are requested partly with FLDs from NDOH (Ofx, Cm, Cs, Eto). Some SLDs are also procured from Australia covering the two years of patients on treatment (Cm, Cs, PAS, Moxi). Australia has also promised to cover the necessary third line drugs for XDR patients.

As some BMUs are far from the provincial office, e.g. some BMUs in Morobe are far from Lae, entries to BMUs including drug status and needs are dictated over the phone. Distribution of drugs from Lae are either by road (44% of active BMUs), by boat (19%) or by plane (37%). Sometimes these are picked up by staff coming over to Lae.

Since SLD management is not JTAI's mandate, there is officially no point person for the distribution of SLDs. The Central PSM Officer who manages the FLDs is also unofficially receiving requests for SLDs from hospitals on an ad hoc basis and arranging the distribution. The PMGH TB Clinic nurse-in-charge of MDR patients would call the Central PSM Officer for SLD replenishment. Drugs would either be picked up from the Badili Drugstore or brought to the Clinic. PMGH would also sometimes distribute drugs to provinces who call them directly. In Angau Hospital, the nurse manager of the MDR ward would either call the Provincial PSM Coordinator or Badili for SLDs. In around 1.5 weeks, the SLDs would arrive via courier (TNT) addressed to the PDCO. The Provincial PSM Coordinator would deliver the drugs to the hospital. There are no paper documentation nor request forms being used.

Conclusion:
FDCs from GDF are now being used, however, there is still a huge amount of loose FLDs. Quality-assured SLDs are being procured, although, there is the threat to shift back to local tender. The existing challenges are as follows: First of all, drug management for FLDs is not integrated in NDOH, being implemented by JTAI. There is no indication that plans are underway to integrate it and make it sustainable, despite the known closure of GF support by Mar 2013. Secondly, the lead time for FLD procurement was very long leading to stockouts for various reasons which has serious implications in generating MDR. Thirdly, there is no

systematic SLD management in the country and, hence, this is currently being done in an ad hoc manner.

The provincial health authorities in Western province were concerned that they were not informed by the private drug distribution company (LD Logistics) about distribution of general drugs to districts and health facilities. Drugs were supposed to be delivered every two months but this year there had been delays of from four to six months. The district health authorities in South Fly had observed that general drugs had been shipped to health facilities that were non-functional and left on sites where they had not been picked up. Both provincial and district health services wanted a return to the drug distribution system some years back when they were directly involved in distribution to the facilities. Theoretically, the role of LD Logistics is only to distribute drugs from the central level to provincial offices or provincial transit stores. It is the responsibility of provinces and districts to distribute drugs from provincial transit stores to health facilities.

Recommendations:

a) Overall drug management:
- Integrate drug management in the NTP; utilize the remaining months before Round 6 closing to provide capacity building to point person for drug management in NDOH; and
- PMDT Committee to initiate discussion for a system of SLD management at the central level down to facilities treating MDR-TB.

b) Selection and use:
- NTP to start using Km as injectable of choice unless Cm is clearly indicated. Keep a certain % of Capreomycin on stock;
- Opt for stronger formulations to minimize the number of pills taken daily, e.g., Ofx 400 mg instead of 200 mg, Lfx 500 and 250 (for 750) rather than three tabs of 250 mg; and
- Use loose FLDs for situational situations, e.g. adverse drug reactions to FDCs, rather than for routine TB treatment.

c) Procurement: NDOH to facilitate and expedite the release of funds particularly for crucial commodities and services, such as, drugs.

d) Storage and distribution:
- Involve provinces and districts in deciding quantity of drugs to be delivered and distribution down to facility level;
- Ensure that the quarterly request form for FLDs is used properly (calculating quantities to be distributed from the real number of patients reported during the previous quarter, adding a three-month buffer, subtracting current stocks), with real stock levels and regular distribution. Loose drugs in health facilities should be brought back and replaced with kits ASAP;
- NTP to ensure coordination of LD Logistics with both central and provincial health offices in the distribution of TB drugs; and
- Distribute much needed drugs, e.g. FDC kits that are still available in central warehouse to the facilities urgently in need of them.

J. Recording and reporting, and data management

Findings:
After the PMDT Country Guidelines were finalized and printed out, PMDT Recording and Reporting (R&R) forms were discussed and approved by the PMDT Core Team. One hundred PMDT Treatment Cards were given to PMGH and DGH each. PMDT Registers were printed out and given to PMDT Centers; DGH was to receive the electronic form of the Register for use in 2012. Guides for using the forms were to be developed.

ANNEX 1

In Angau General Hospital, the PMDT Register was in use. The team found the following: a) unconfirmed MDRs waiting for treatment were registered together with those started on treatment; b) some variables were not clear or relevant to the user, such as, the history of second-line drug use, and the method used for culture; c) acronym mislabeled, e.g., "Rt" for retreatment was labeled as "treatment"; and d) the spaces for DST results, smear/culture results, and HIV were not updated.

Treatment Cards for MDR-TB patients have not been printed out yet due to lack of funding. However, Treatment Cards were in use in Angau Hospital drafted by the previous Health Extension Officer who, unfortunately, had left. The portion for daily supervised treatment (DOT) was consistently filled out by the HC staff but other entries were not updated.

Reporting forms for notification, interim and final results were not available in Angau.

In Daru, there is both a handwritten PMDT register and an excel sheet with the same information. The new PMDT treatment card has not yet been used. The clinical records included a sheet (copy of PMDR treatment card) for smear, culture and DST results during follow-up. The handwritten PMDT register since the beginning of 2011 had very scarce information for the 2011 patients but more complete for 2012. The date of registration was the same date in July 2012 for all 2012 patients January-July (when the register was filled-in). To assess MDR-TB case finding, the team, therefore, used the date of DST result but, in some cases, the date of MDR treatment start date was earlier than DST result. Smear and culture data for follow-up were missing in most cases.

Quarterly reports of PMDT had not yet been used. It was a challenge to count accurately how many MDR cases had actually been detected by quarter and year, how many of them had started MDR treatment and to assess preliminary outcome of treatment. The current routines probably create a lot of double work without producing the necessary information the program needs. The GeneXpert register was discussed in the laboratory chapter.

Currently, the WHO Medical Officer requests for ad hoc updates on MDR-TB patients from the PMDT centers. There is no regular reporting from the treatment centers to the national level.

Conclusion: Only the PMDT Register is being piloted and often not filled out in detail. The other forms for recording and reporting were not yet printed. At the moment, there is no proper data management at the treatment facility levels; and no reporting has been made at the central level making it difficult to come up with meaningful notification, enrollment and outcome data.

Recommendations:

1. Get feedback on the PMDT Register from pilot users and modify the current form accordingly;
2. Print out all other forms for PMDT recording and reporting, including Treatment Cards, and pilot test in all PMDT sites;
3. Arrange for on-site technical assistance by an experienced PMDT R&R specialist;
4. Conduct a training for R & R to staff in-charge of R & R at all levels; and
5. Ensure that all cases detected by Xpert with Rif-resistance are included in the BMU register and in the Quarterly report on case finding. Their treatment outcome should be failure/Rif-resistant started MDR treatment. Enter into the BMU register results from the GeneXpert register and also DST results, so that patients with resistance to SLDs can clearly be seen and counted.

K. Infection control

Findings:
Managerial aspect
Apparently, based on a TB-Infection Control (IC) consultancy visit made to Papua New Guinea in May 2010,[18] there is a good IC structure at the NDOH where a fulltime position is dedicated to IC, with facilities having an IC Officer, an established IC Committee, and an IC plan updated each year; however, these efforts focused mainly on contact-borne and not on airborne precautions. AusAID was funding a TB-IC consultancy the week after this PMDT mission to be followed up with another visit in January 2013.

Administrative controls
One of the findings in recent visits was the lack of administrative controls in the ward, allowing families including an infant to stay together with MDR-TB adults.[4] It was briefly discussed in this mission that this remains a challenge since patients need assistance while on confinement by family members. Triaging and separation of infectious and immunocompromised cases do not appear to be observed. In the TB Clinic waiting area in PMGH, all the patients sit beside each other; in the ward, patients are separated according to smear status and not by gender. HIV patients are also kept in the same ward as the non-HiV MDR patients.

In Daru, staff have been trained in IC; routines have been introduced and patients' rooms organized separating smear-positive from smear-negative and confirmed MDR from others. Staff were using masks in the infectious zones, but the TB team complained that it was hard to make health staff follow instructions on safety. The new TB ward under construction will facilitate implementation of IC practices further. The 40 MDR-TB patients who stay in Daru Island after discharge come daily to the ambulatory part of the TB ward. Theoretically, 20% of the patients were still smear-positive. The waiting area is basically inside the building and quite crowded (with other TB patients), hence, some reorganization is needed to reduce the risk of transmission.

Engineering controls and Personal protective equipment (PPE)
There were some IC concerns and safety issues in the laboratory setting in DGH [2] including the need to review the laboratory layout/design, the lack of basic safety equipment and training and lack of PPE. The same is true for the other facilities visited, e.g. PMGH and in Angau Hospital. No masks were worn by patients, and not all staff were wearing respirators in the ward. Also, no fit testing of respirators has been done for staff.

In Daru, a number of health staff have developed TB in recent years, but only one worked in the TB ward and developed TB less than three months after having started work in the ward, suggesting that he was infected earlier. This implies that staff are infected outside the hospital, or in other wards from patients not yet known to have TB.

Conclusion: TB-IC needs strengthening in all treatment facilities. A TB-IC consultancy has been arranged and is expected to provide up-to-date and relevant recommendations.

Recommendations:
PMDT Core Team to:
- Appoint a TB-IC person to implement IC-related recommendations of IC consultant including taking the lead in TB-IC planning and monitoring.

L. Human resource, Training and Technical Assistance strategy

Findings:
Human resource (discussed above)

[18] TB-IC consultancy visit to PNG, 10-20th May 2010. Arch Thea Zuccttti, IC Specialist

Training:
WHO in collaboration with the NDOH organized a five-day PMDT Training of Trainers in November 2011. This was attended by NTP staff, and at least four provincial physicians including the MDs managing MDR-TB in PMGH, DGH, Angau Hospital and Madang, and partners. Other staff in the NTP have previously attended international PMDT trainings. However, the current PMDT Focal Point has not been to these trainings. Also, the other focal points in specialized areas, such as, Infection control, Recording and Reporting and Drug management, as soon as designated, need to be equipped to perform according to standards.

Areas where training is perceived to be necessary are on the following: 1) Leadership and Program Management course for the NTP Manager and PMDT Focal Point; 2) PMDT Recording and Reporting training – for nurses; 3) PMDT training for clinicians based on modules; 4) Drug management course for newly recruited TB/Leprosy PSM officer; and 5) Supervision training.

Technical assistance:
There is an urgent need for technical assistance (TA) in Recording and Reporting and SLD management. Primarily, point persons for these two areas from the central level need to be designated with these important responsibilities, and provided TA.

TA on the following important areas are crucial for sustainability: 1) Proposal-making in line with the New Funding Mechanism of GFATM; and 2) Development of an ASCM strategy (to involve provinces to support the TB program).

Recommendations:
The NTP to:

- request for technical assistance in PMDT Recording and Reporting;
- request for technical assistance in SLD management especially forecasting, and distribution; and
- have designated PMDT Focal Point undertake capacity building on PMDT either in-country when there are missions and courses, or outside Papua New Guinea.

M. Supervision and monitoring of the programme; M&E

Findings:
JTAI, under Global Fund support, is the partner in-charge of M&E and Procurement and Supply Management (PSM). An M&E Officer is hired in each province, who will sometimes serve as the PSM Officer at the same time, as in the case in Morobe. The role of the M&E Officer is very crucial in an NTP structure. He collects BMU reports quarterly, reviews and makes feedback, and forwards the reports to the central M& E Officer. He conducts BMU visits every quarter, and provides technical assistance to the staff in the field.

In Morobe province, out of 34 BMUs, only 19-23 submitted BMU reports quarterly in the last four quarters. It was explained that there are BMUs that are not really active and would just avail of services of adjacent BMUs. Supervision is also not done to all provinces. In a quarter, 3-4 BMUs are visited, or 12-16 a year. This is due to lack of funding, as well as geographical accessibility, as claimed by the M&E Officer.

A comprehensive Supervisory Checklist (8 pages) made by the NDOH is seldom used, while a shorter JTAI checklist is more often used by M&E Coordinators. These checklists however, do not include MDR-TB.

Recommendation:

- NTP through the PMDT Core Team to incorporate MDR-TB monitoring and supervision details in the current form being used for DOTS. Technical assistance on this can be sought from the WHO-WPR.

N. Program and/or project indicators for PMDT

Findings:
Based on the NTP strategic Plan 2011-2015,[11] the programme indicators and targets for PMDT are as follows:

Table 9. Program indicator and targets for PMDT, 201-2015

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Expected no. of MDRs among retreatment	456	491	547	571	596	621	648	675	703
% MDR-TB cases to manage under the NTP		10%	20%	25%	33%	50%	50%	50%	47%
No. of cases to treat		49	109	143	197	311	324	337	333
% MDR initiated treatment becoming culture –negative in mo 6					30%	35%	40%	45%	50%
No. MDR initiated Tx becoming culture negative at mo 6					59	109	130	152	165

The expected number of MDRs among retreatment is based on the estimated MDR rate of 13.8% MDR among retreatment cases. The programme calculated to treat only a proportion of the identified MDRs in a phased manner targeting first 10% in 2011 of the expected number then applying increments every year till 50% in 2017. Hence, the number of patients to treat started at 49 in 2010 increasing to 333 in 2018. The target for interim outcome assessment is first 30% in 2014 of those initiated treatment, to be culture-negative on month six, until 50% is reached in 2018.

One concern at this point is that there is no clarity on when to start counting the patients enrolled under this setting. The database in some of the hospitals start all the way back to 2009. Moreover, the current R&R data are not in order; therefore, it is not easy to determine the actual accomplishment.

Recommendations:
The NTP

1. to consider starting PMDT recording and reporting of patients enrolled after the TOT was conducted (January 2012 onwards) to have a common cut-off for all treatment centers; and
2. to revisit the targets set for PMDT as soon as results of DRS are out, and revise accordingly, if necessary.

ANNEX 1

III. Annexes:

Annex 1
Terms of Reference (TORS) for this mission

1. To assess implementation of the program activities required for the proper detection and management of the programmatic management of drug resistant TB;

2. To review the progress of implementation of the recommendations from the previous Technical Assistance Mission on PMDT;

3. To review and advise on the national plan for MDR-TB management;

4. To assess the effectiveness of all development partner inputs in assisting the NTP to strengthen TB/MDR-TB services in the Papua New Guinea; and

5. To assess the impact of the investments made on the development of TB/MDR-TB services in Papua New Guinea on overall health systems strengthening.

Annex 2
Activities and people met

Date	Time/Site	Activity	People met
Day 1 Fri, 23 Nov 2012	9-9:30AM	Briefing with WHO	**WHO-PNG:** Dr. Bieb Sibauk, Exec. Manager for Public Health Dept. Dr Fabian Ndenzako, Team Leader, DCC; Dr Shalala Ahmadova. TB Medical Officer; Dr Priscilla Nad, TB/HIV Medical Officer **Consultants:** Dr. Einar Heldal, Ms. Karen Johnson, Dr Ma. Imelda D. Quelapio
	9:30-10AM	Briefing with NDOH	**NDOH:** Dr P Dakulala, Deputy Health Secretary Anna Maalsen, Public Health Advisor **WHO-PNG:** Dr B. Sibauk, Dr. F. Ndenzako, Dr S. Ahmadova, Dr P. Nad **Consultants:** Dr E. Heldal, Ms K. Johnson, Dr MI Quelapio
	10-12NN	Meeting NTP and Partners	**NDOH, NTP:** Dr Paul Aia, National Progam Manager **Port Moresby Gen Hospital (PMGH):** Dr Joseph Bana-koiri, TB consultant **National Capital District (NCD):** Dr Niko Wuatai, Health Services **AusAID:** Dr Geoff Clark **World Vision –PNG:** Dr Curt von Boguslawski – Country Program Director; Dr Ernesto Bontuyan, Grants Compliance Manager, Stella Rumbam, TB ACSM Manager **JTAI:** Dr David Hunsberger, Head, Technical Officer/Manager **USAID; Hope Worldwide**
	1-2PM	Visit to Port Moresby Gen. Hosp Administration	PMGH Hospital Medical Director
	2-4PM	Visit to Central Public Health Laboratory (CPHL)	Jennifer Banamu – TB Laboratory staff
Day 2 Sat, 24 Nov	6-8PM	Team Meeting	Consultants
Day 3, Sun, 25 Nov	Team 1 and Team 2	Travel	**To Daru:** (NDOH) Dr Paul Aia and Dr Herolyn Nindil Dr C van Weezenbeek, Dr E.Heldal **To Lae, Morobe: Dr** R. Yasi (NDOH), Ms Stella Rumbam, Ms Helen Tona (W. Vision); Dr S. Ahmadova (WHO-PNG), Dr K. Johnson, Dr M. Quelapio
Day 4, Mon 26 Nov	DARU (Team 1)	Meeting Provincial health authorities Daru General Hospital (DGH) administration	Provincial health services, Director: Dr Alice Honjepari NDOH/AusAID/World Vision TB project South Fly/Western Province: Dr Rendi. Moke, Dr Alma Acub, Dr P.Aia, Dr C. van Weezenbeek, Dr E.Heldal

		DGH	CEO Dr/Sr. Marin Joseph, Dr P. Aia, Dr R. Moke, Dr Abel Marome (provincial TB Program coordinator), Dr A. Acub, Dr C. van Weezenbeek, Dr E.Heldal
		OPD	Sr. Paul – Nursing Officer on duty; Mr Macknel – Nursing Officer,
		Laboratory	TB sputum microscopists: Mr Maika Dare'e, Mr Noman Davey, Sputum Microscopist /GeneXpert (on training, not present): Mr Alfred Sarigi, Mr Sias Yufai – Medical Laboratory Scientist (MLS), Mrs Tibiniyato Topeao – MLA, Mr. Sisa Udu – OIC laboratory
		TB communications Center	Dr R. Moke, Dr P Aia, Dr. H. Nindil, Dr A. Acub, Sr. Sila Wainettie, Sr. Stella Madiowi, Dr A. Marome, Dr C. van Weezebeek, Dr E. Heldal
	MOROBE (Team 2)	AM: Visit to Provincial Health Team	**Morobe Provincial Team:** Technical Officer: Mr Jack Aita; PDCO: Mr Edwin Benny; Prov'l M&E and PSM Officer: Isdore Pius; ACSM Officer, Lae: Tresa Nahuet
		Visit to Angau Hospital Administration, and Angau Hospital	**Angau Hospital:** CEO: Dr Polapoi Chalau; Director of Medical Services: Dr Songli Soctinec, Dr Ruso Peroni. ***Angau MDR Ward:*** Physician: Dr Bernard Belari; Health Extension Officer: Lingayam Bumbu; Nurse Manager: Sr Hirata Dobadoba. ***Angau TB Clinic:*** Allena Galis. ***Angau Microscopy Center:*** Joeseph So'on, Lab Manager, Miriam Suma, TB Microscopist, Carol Kilipi (CHW), TB Microscopy
		PM: Visit to Butibam Health Center, Lae	**Butibum Health Center (BMU):** Nursing Manager: Sr Nellie Taleng; TB Nurse: Sr Saluwi Mala Consultants: Dr S. Ahmadova; Dr K. Johnson, Dr M. Quelapio, WV, NTP: Dr Robin Yasi, Stella Rumbam and Helen Tona
Day 5, Tue 27 Nov	DARU (Team 1)	Daru General Hospital Communications centre: MDR situation and plans	Dr A. Acub, Dr C. van Weezenbeek, Dr E.Heldal; Dr R Moke, Dr A Marome, Dr P. Aia, Dr H. Nindil
		South Fly District Health Office	Alois Nakamole, District Health Manager; Fred Awai, District Disease Control Officer; Abel Diani, District Health Inspector; Densley Pleno, District Health Coordinator; Dr C. van Weezenbeek, Dr E. Heldal

		Meeting with Community DOT providers, Daru Meeting with hospital direct department directors DGH Communications center: Statistics	Dr R Moke, Dr A Morome, Dr P Aia, Dr H Nindil, Dr C. van Weezenbeek, Dr E.Heldal Sr Joseph, Chief Executive Officer, DGH; Director Medical Service: Dr Smith Pinai; Director Nursing Services: Mr Thomas Awayang; Unit Managers of various wards including TB ward and TB OPD: Infection control person: Peter Pinda Dr R Moke, Dr A Morome, Dr P Aia, Dr A Acub, Dr H Nindil; Dr C. van Weezenbeek, Dr E.Heldal
	MOROBE (Team 2)	AM: Visit to Lae transit store and Morobe Area Medical Store PM: Travel from Lae to Port Moresby (6:45-7:30PM)	**Area Medical Store, Lae: Technical Advisor:** Malcolm Sambak **PHO Logistic Store, Lae:** I Pius; ACSM Officer: T Nahuet
Day 6, Wed 28 Nov	DARU (Team 1)	Visit by boat to Mabuduan health center	Mr Masluk Gibia, Community Health Worker Dr A Marome, Dr P Aia, Dr H Nindil, Dr C.van Weezenbeek, Dr E. Heldal
	PORT MORESBY (Team 2)	Visit to PM Gen Hospital Visit to Badili Urban Clinic	**PMGH TB Clinic:** J. Bana-koiri; Nursing Manager: Sr. Travetz **WHO:** Dr P Nad, Dr S. Ahmadova; **NCD Health:** N Wuatai; Director Public Health, Geraldine Towaira, TB/Leprosy Officer, Peter Aupika, ACSM Officer; **NTP:** Dr R Yasi ; **WV:** S Rumbam; **Hope WorldWide:** Francil Leo, National TB Project Coordinator; **PMGH MDR Ward:** Nursing Manager; Dr M. Quelapio, Dr K. Johnson **Badili Urban Clinic:** N Wuatai, Director Public Health, G Towaira, P Aupika; Clinic staff: Rose Mantu, Joel Raba, Mary Kuri **Hope WorldWide:** F Leo; **NTP:** R Yasi; **WV:** S Rumbam
Day 7, Thu 29 Nov	DARU (Team 1)	8.30 TB ward and isolation room, Daru Hospital 10.30 TB communications room: statistics, summing up 11am: summing up meeting with hospital, provincial and district health service 1.30pm leave for airport	Dr R Moke, Dr C.van Weezenbeek, Dr E. Heldal Dr A Marome, A Acub, H Nindil Dr Joseph(Doctor); Provincial Health Administration: Mrs Lucy Morris, Deputy Director Rural Health Services F Awai, District Disease Control Officer, Phil Dowton, health adviser, Western Province, AusAID Peter Pinda, Inf control person, NDOH Dr R Moke, Dr A Marome, A Acub, Dr P Aia, H Nindil, Dr C.van Weezenbeek, Dr E. Heldal

		Travel from Daru to Port Moresby (2.oo PM-5:50 PM)	
	PORT MORESBY (Team 2)	Visit to PM Area Medical Store, Badili	**Badili Drugstore** **JTAI Office** (not in mission schedule): D. Hunsberger WV: Stella Rumbam; Dr M. Quelapio, Dr K. Johnson
Day 8 , Fri 30 Nov	9:00 -12:00	Debriefing with NDOH and partners	**NDOH:** Dr P Dakulala, Deputy Health Secretary Elva Loinel, Deputy Secretary for Policy & Planning Dr Margaret Kal, Regional Medical Officer **PMGH:** Dr J. Bana-Koiri; **WHO-PNG:** Dr William Adu-Krow, Country Representative; Dr F. Ndenzako, Dr S. Ahmadova, D. P. Nad **Partners:** World Vision: C von Boguslawski, E. Bontuyan, S Rumbam; JTAI: D. Hunsberger; CDC: Avi Hakim; AusAID: Anna Maalsen **Consultants:** Dr C. van Weezenbeek, Dr E. Heldal, Dr K. Johnson, Dr M Quelapio

Annex 3
Previous mission
(Technical Assistance mission to South Fly District, 15-21 October 2011)
Recommendations and Status

Recommendation	**Yes/No**	**NTP and WHO-PNG Comments**	**Technical mission team comments**
1. Provincial Health Authorities (and development partners) ensure the delivery of routine drug supplies to health facilities and visit them to support the health care workers in their demanding tasks.	Partly	100% health center kits to health facilities – distributed annually (supported by AusAID)	The health center visited in WP received general kits in September 2012, after a long disruption, while provincial and district level authorities reported major disruption in supplies and complained that they were not involved in the distribution which has been outsourced to private companies. The district health authorities had observed that drugs had been shipped to non-functioning health facilities and left at sites where they had not been picked up. Both provincial and district health

			services wanted a return to the drug distribution system some years back when they were directly involved in distribution to the facilities.
Provincial Health Authorities reprogramme Global Fund resources to ensure that Global Fund funded activities are complementary to those funded by AusAID. Given the challenges the province is facing we strongly recommend to benefit from both GF and AusAID funding.	Partly	WV is the PR for the GF round 6 grant and at the same time, the recipient of AusAID funds for the Western Province.	NDOH decided not to include WP in the GF expansion plan, but GF has supported procurement of TB drugs and the positions of M&E officers in the districts.

The National Department of Health immediately stop the policy of providing single drug preparations and use only fixed - dose drug combinations, a major policy change to prevent further drug resistance.	Yes	FDCs are procured via the GDF and they are in the country	NDOH have procured FDCs for the whole country with GF. NDOH should ensure continued procurement of FDCs when GF ends it support. FDCs are already distributed to all districts in WP, already covered are six health centers (Mabuduan, Morehead, Balimo,Rumgliane, Kiunga, Awaba). The rest will be covered shortly after training of staff. Single drugs are being retrieved from centers introducing FDCs.
The National Tuberculosis Program institute a policy of direct observation of drugs for tuberculosis patients to prevent further development of drug resistance.	Yes	New TB protocol 2011 contains this information and it has been printed and distributed for trainings.	Daru island has maintained the strong system of committed community treatment supporters for non-MDR cases daily during the whole treatment. There are now treatment supporters also in 11 villages. MDR patients staying in Daru after discharge, come daily to the hospital for their drugs. Currently MDR patients

			were also on treatment in seven villages outside Daru.
5. The National Department of Health in collaboration with provincial health authorities put in place a management structure with full - time provincial coordinators and full - time coordinators for basic management units to ensure efficient management of tuberculosis patients to improve the comprehensiveness of diagnostic sputum smear examination and to enhance treatment results and prevent resistance.	In progress	A lot of advocacy has been done in relation to that (part of the strategic plan, TB policy and advocacy during all workshops, meetings, training). As a result, NCD created the post and recruited the TB/Leprosy officer, Manus and NIP provinces are absorbing TB/ME officer and ASCM coordinator as full-time TB/Leprosy officers for the province.	The Provincial health authorities have advertised three district TB coordinators while Mr Abel Mukome is functioning as provincial TB Coordinator. A District Disease Control Officer has started working three months ago in the South Fly District. Supervision of the TB programme has taken place in districts, health centers and aid posts with funding from AusAID including use of the new sea ambulance "Medics Queen" based in Daru. For TB operations the provincial health authorities have provided PGK100 000 for each district. According to the province health administration, districts had partly used the funding for other purposes. In 2013 the funds would, therefore, be controlled by the province. Another 50 000 was available for each district from the national health function grant for supervision, medical supplies and facility maintenance, based on an annual activity plan. All partners should strengthen coordination and collaboration between organizations involved, using the provincial implementation plan (AIP) to work jointly towards full provincial access to quality diagnosis (microscopy network) and treatment of TB. In order

			to strengthen sustainability of TB prevention and control, the NDOH provincial and district levels should take key roles in planning and implementation.
The National Tuberculosis Program implement the information system for MDR - TB patients to ensure accurate accounting for the management of MDR - TB patients.	Partly	2011 PMDT data have been collected, PMDT forms are being piloted in two hospitals (Daru and PMGH)	The system has been partly implemented, with PMDT registers in place, while PMDT treatment cards have not been used yet in Daru. Data are not clear and it is a challenge to generate data on MDR cases detected, started on treatment and preliminary outcome.
7. The National Department of Health take up for discussion in the Health Issues Committee that patients with Papua New Guinea nationality are treated according to the national guidelines (for example, the use of fixed dose combination medications and directly-observed treatment).	Yes	Annual cross-border meetings and patients are offloaded to PNG side to be managed	By mid 2012 all TB patients treated in Australia have been handed over to Daru hospital.
Tuberculosis services, whether in the public sector or in projects supported by partners, set in motion a formal mechanism for community consultation (for example, the Community Advisory Board) to engage local communities in planning of services that affect them. Development partners ensure that adequate human and financial resources are available to support the key consultative role of the regional supranational tuberculosis laboratories which are key to making further progress in managing drug resistant tuberculosis in Papua New Guinea.	In progress	TB task force in Daru and TB committees in other provinces	In the Treaty villages community treatment supporters are being trained, raising awareness, detecting TB suspects and treating TB cases. Better communication and collaboration between the NRL PNG and SRL, Australia is required. Until such time culture and DST is available in PNG, funding must be allocated to send specimens to QMRL for full DST.

The National Department of Health and partners establish capacity to do drug-resistance testing in the Central Public Health Laboratory. In the mean time, the supra - national reference laboratory in Brisbane reduce diagnostic delays by informing Daru immediately of the results of rapid drug susceptibility testing (Xpert or LPA) while awaiting confirmation of MDR - TB diagnosis by conventional techniques.	Not yet Yes, in Daru	Daru, CPHL Madang and Morobe provinces have X-perts to diagnose R-resistance.	Culture is still not done in the CPHL. GenXpert was started up in Daru in May 2012 and Port Moresby in February 2012. DST for 1. and 2. lined drugs is provided by Brisbane but with a delay of 4-10 weeks. Efforts are under way to speed up the shipment. Phone is now functioning in Daru.
WHO and partners offer extensive long-term technical assistance to strengthening TB services in general and the PMDT component in particular by training (first organized in November) and regular supportive general and specialized technical assistance missions.	In progress	WHO has a Medical Officer and TB/HIV NPO in place in Port Moresby. Papua New Guinea also receives continuous support from the WHO Western Pacific Regional Office (missions, training, workshops etc.). USAID and CDC has also come forward with TA proposals.	
Support health personnel to better serve the civilians	yes	Majority of clinicians of remaining 11 provinces were trained from June to February 2012. Regular supervisions take place with GF money.	Supervisions taking place with sea ambulance and more funding for travel in WP
Engage an independent infection control expert to further strengthen	No	Not requested by the NTP	One expert was visiting Daru at the same time as this WHO

infection control measures			PMDT mission in November 2012 and is scheduled to return in January 2013 with AusAID funds.
Have the plans for the MDR - TB isolation ward reviewed by a trained TB infection control (IC) engineer (both can be arranged through WHO)	No		The IC specialist did not have access to the drawings of the TB ward in Daru (nor had the hospital Director)
Fully engage the cadre of trained community treatment supporters in ambulatory MDR - TB treatment, starting with introducing patients, treating physicians and supporters to each other during hospitalization to familiarize and ensure proper referral mechanisms for treatment monitoring (sputum and blood) and in case of side effects	No/partly	Daru	Treatment supporters are not attending to MDR patients who instead come daily to the hospital. Some MDR patients in communities outside Daru are followed up by treatment supporters.
Order a reserve stock of PAS for complicated MDR - TB cases that require strengthening of the regimen or replacement of drugs in relation to side effects	Yes	AusAID support	Done, PAS available
National Tuberculosis Program to consider reducing the number of sputum samples in TB suspects from 3 to 2, in line with WHO recommendations	Yes	Already in policy	Done
National Tuberculosis Program Central Unit/WHO should ensure that completeness of TB data in accordance with WHO guidelines, including quarterly outcome reports that include all diagnosed and notified cases.	In progress, improving		Need to ensure that all patients detected with GeneXpert are included in BMU register, as well as all conformed TB patients who die or default before treatment start.
The National Department of Health with other partners analyze and monitor the situation of TB with the focus on MDR - TB in other sites throughout the country.	Yes	Done monthly, during the TB working Group meetings	Discuss DRS
The National Tuberculosis Program	Yes	Done during TB	Ensure M&E and drug

train staff in recording and reporting, in use of the information system to improvement management and supervision. 5. The National Tuberculosis Program make sure that all MDR - TB patients are receiving treatment line with international guidelines with quality assured second - line drugs 6. The National Tuberculosis Program improve the filing system for records and papers.		clinicians training TB treatment regimens are in line with the National protocol in PMGH and Lae.	management is part of the tasks of the provincial and district TB coordinators. MDR patients in Daru 2012 did not receive Ethionamide because DST showed resistance and colleagues in Queensland advise strongly to omit – in contrast to WHO recommendations

Annex 4A
TB notification by province 2011-2012

Province	Population 2010*	Quarters reporting 2011	Quarters reporting 2012	All TB cases 2011	All TB Projected 2012**	Rate all TB 2011 per 100 000	Rate all TB 2012 per 100 000**	New sm+ 2012**	New sm+ projected 2012**	Rate new sm+ 2011	Rate new sm+ 2012**
Morobe	646 876	4	3	2233	2401	345	371	494	459	76	71
National Capital District	318 128	4	3	5293	5339	1664	167 8	443	480	139	151
Eastern Highlands	582 159	4	3	1531	1698	263	292	80	86	14	15
Madang	487 460	4	3	1355	1472	278	302	310	291	64	60
Milne Bay	269 954	4	3	400	684	148	253	84	109	31	40
Chimbu (simbu)	403 772	4	3	1240	763	307	189	38	24	9	6
East Sepik	433 481	4	3	920	803	212	185	116	249	27	57

Southern Highlands	868 209	4	3	1024	841	118	97	32	15	4	2
Western Highlands	694 862	4	3	1366	1410	197	203	85	74	12	11
Central	237 016	2	3	137	668	58	282	27	97	11	41
Eastern New Britain	271 250	2	3	97	653	36	241	2	213	1	79
Enga	452 596	1	3	20	610	4	135	0	82	0	18
Oro Northern	176 206	1	3	126	898	72	509	17	132	10	75
West New Britain	242 676	4	3	618	737	255	304	31	57	13	23
Bougainville	234 280	3	3	273	311	117	133	35	81	15	35
Gulf	121 128	0	3	0	894	0	738	0	35	0	29
Manus	503 21	0	3	0	74	0	148	0	11	0	22
New Ireland	161 165	1	3	16	251	10	156	7	40	4	25
Sandaun (west sepik)	227 657	1	2	60	154	26	68	7	25	3	11
Western	180 455	4	3	398	750	221	416	52	188	29	104
PNG	**705 965 1**			**17107**	**21412**	**242**	**303**	**1860**	**2748**	**26**	**39**

**source: www.citypopulation.de/PapuaNewGuinea.html (Post-Courier Online) **2012 projected from 1+2+3 quarter*1,33*

Annex 4B
TB notification under a phased approach of DOTS expansion, PNG (2008-2012), R6 of Global Fund

PNG NTP Notifications by Prov : 2011 Q1-Q4

Province	*Notifications* New SS+	Relapses	Failure	Defaulted	SN	NDNA	EP	Others	New + Relapses	All Cases
Yr 1										
NCD	443	57	10	40	242	1833	2091	577	4666	5293
MOROBE	494	19	10	12	160	454	960	124	2087	2233
Yr 2										
EHP	80	0	0	5	123	326	906	12	1435	1452
MADANG	310	16	4	24	159	272	466	77	1223	1328
MILNE BAY	84	4	1	11	64	66	109	51	327	390
Yr 3										
WHP	85	3	4	4	129	517	587	37	1321	1366
CHIMBU	38	0	0	0	97	644	405	56	1184	1240
SHP	32	10	1	1	208	467	246	59	963	1024
ESEPIK	116	4	1	9	21	299	261	130	701	841
Yr 4										
WNB	31	1	0	4	11	101	37	14	181	199
CENTRAL	27	2	3	2	23	19	60	1	131	137
ORO	17	5	2	0	10	53	29	10	114	126
ENB	2	1	1	4	9	10	0	65	22	92
ENGA	0	0	0	0	0	0	0	0	0	0
Yr 5										
WESTERN	52	13	2	1	58	51	138	16	312	331
BVILLE	35	0	1	4	14	9	16	25	74	104
SANDAUN	7	4	0	0	12	10	21	6	54	60
NIRELAND	7	0	0	1	2	1	5	0	15	16
GULF	0	0	0	0	0	0	0	0	0	0
MANUS	0	0	0	0	0	0	0	0	0	0
Grand Total	1860	139	40	122	1342	5132	6337	1260	14810	16232

Annex 5
Rate of smear not done
Butibum, Morobe Health Centre TB Suspects' Register

	1st QTR	**2nd QTR**	**3rd QTR**	**TOTAL**
TB symptomatics	47	70	76	193
Smear Positive	14 (30%)	21 (30%)	24 (32%)	59 (31%)
Smear Negative	21(45%)	40 (57%)	42 (55%)	103 (38%)
No Smear Result	12 (25%)	9 (13%)	10 (13%)	31 (16%)
Patients commenced on treatment	13	22		35
Smear Positve	10	17		27 (77%)
Smear Negative/CXR	3	2		5 (14%)
Smear Negative/No CXR	0	2		2 (6%)
No Smear/No CXR	0	1		1 (2.8%)

Annex 6

PNG NTP Notifications 2011Q3 - 2012Q2 (last 4 qtrs)

	Notifications													
Province	New SS+	Relapses	Failure	Defaulted	SN	NDNA	EP	Others	All Cases	PTB Cases	Smear NDNA Rate	EPTB Rate	Smear+ Rate for PTB	Smear+ Rate All Forms
BVILLE	40	3	4	8	24	25	46	23	173	127	28%	34%	43%	32%
CENTRAL	41	6	0	2	37	82	148	18	334	186	51%	48%	26%	15%
CHIMBU	30	2	4	0	91	390	289	47	853	564	76%	36%	6%	4%
EHP	82	0	0	4	179	365	1003	17	1650	647	58%	62%	13%	5%
ENB	108	10	6	11	34	56	10	78	313	303	28%	5%	45%	43%
ENGA	57	5	2	12	98	47	85	15	321	236	23%	30%	32%	24%
ESEPIK	212	6	2	4	39	143	266	46	718	452	36%	40%	50%	31%
GULF	22	0	0	0	70	169	80	47	388	308	65%	23%	7%	6%
MADANG	283	18	8	24	137	358	460	85	1373	913	46%	37%	36%	24%
MANUS	5	0	1	1	1	11	17	3	39	22	65%	50%	32%	18%
MILNE BAY	81	1	1	4	60	110	138	43	438	300	44%	35%	29%	20%
MOROBE	477	21	16	18	155	518	1051	155	2411	1360	45%	48%	39%	22%
NCD	472	63	9	28	217	2018	2235	468	5510	3275	75%	45%	17%	10%
NIRELAND	14	0	8	6	66	41	7	7	149	142	34%	5%	20%	19%
ORO	70	11	6	18	51	240	164	46	606	442	66%	31%	24%	17%
SANDAUN	7	0	0	1	10	26	25	6	75	50	60%	37%	16%	11%
SHP	16	12	0	1	230	410	214	62	945	731	63%	25%	4%	3%
WESTERN	94	40	2	7	26	68	186	33	456	270	36%	50%	53%	31%
WHP	79	1	3	3	108	547	640	34	1415	775	75%	47%	11%	6%
WNB	55	2	1	9	21	177	73	30	368	295	70%	22%	23%	18%
Grand Total	2245	201	73	161	1654	5801	7137	1263	18535	11398	60%	42%	24%	14%

Annex 7A
Treatment outcomes among new smear-positives per province, 2011

DOTS Coverage (All)

NTP Treatment Outcomes for 2011 Q1-4 : by Province

(rates computed against NS+ Reg)

Year	Prov	Outcomes: NS+ Notifs (2010 cohort)	NS+ Reg	NS+ Cure	NS+ Completed	NS+ Died	NS+ Failure	NS+ Default	NS+ Trans	Default Rate	Cure Rate	Success Rate
Yr 1	MOROBE	504	461	347	35	17	13	45	1	10%	75%	83%
	NCD	480	557	344	42	20	14	138	48	25%	62%	69%
Yr 2	EHP	94	100	64	9	6	0	15	6	15%	64%	73%
	MADANG	315	292	197	21	14	3	47	10	16%	67%	75%
	MILNE BAY	164	124	75	23	11	4	8	3	6%	60%	79%
Yr 3	CHIMBU	65	32	22	4	1	0	3	2	9%	69%	81%
	ESEPIK	94	84	6	37	4	0	37	0	44%	7%	51%
	SHP	61	80	20	33	3	2	2	2	3%	25%	66%
	WHP	37	62	37	17	0	0	7	1	11%	60%	87%
Yr 4	CENTRAL	36	68	19	20	0	2	17	10	25%	28%	57%
	ENB	249	0	0	0	0	0	0	0			
	ENGA	222										
	ORO	0	12	7	0	0	0	0	2	0%	58%	58%
	WNB	33	35	11	1	1	1	20	1	57%	31%	34%
Yr 5	BVILLE	54	7	2	3	0	0	2	0	29%	29%	71%
	GULF	0										
	MANUS	1										
	NIRELAND	5										
	SANDAUN	34	2	1	1	0	0	0	0	0%	50%	100%
	WESTERN	82	54	29	5	7	4	7	2	13%	54%	63%
Grand Total		2,530	1,970	1181	251	84	43	348	88	*18%*	*60%*	*73%*

Annex 7B
Treatment outcomes among retreatment cases per province, 2011

Treatment Outcomes 2011 Q1-4 : All Retreatments *(relapses, after failure, after default)*

Yr / Prov	*Retreatment Outcomes*: Retreat Reg	Retreat Cure	Retreat Completed	Retreat Died	Retreat Failure	Retreat Default	Retreat Trans	Retreat Default Rate	Retreat Cure Rate	Retreat Success Rate	Eval Rate
Yr 1											
NCD	103	52	15	2	0	30	4	29.1%	50.5%	65.0%	100.0%
MOROBE	50	33	4	0	1	12	0	24.0%	66.0%	74.0%	100.0%
Yr 2											
MADANG	42	21	4	4	0	10	3	23.8%	50.0%	59.5%	100.0%
MILNE BAY	24	6	4	7	5	4	1	16.7%	25.0%	41.7%	112.5%
EHP	3	0	2	0	0	1	0	33.3%	0.0%	66.7%	100.0%
Yr 3											
ESEPIK	24	3	11	2	0	7	1	29.2%	12.5%	58.3%	100.0%
CHIMBU	8	7	1	0	0	0	0	0.0%	87.5%	100.0%	100.0%
WHP	8	1	4	0	0	2	1	25.0%	12.5%	62.5%	100.0%
SHP	3	0	1	1	0	0	1	0.0%	0.0%	33.3%	100.0%
Yr 4											
ENB	6	4	0	0	0	0	0	0.0%	66.7%	66.7%	66.7%
WNB	5	1	0	0	0	4	0	80.0%	20.0%	20.0%	100.0%
ORO	5	0	1	0	1	0	0	0.0%	0.0%	20.0%	40.0%
CENTRAL	4	2	2	0	0	0	0	0.0%	50.0%	100.0%	100.0%
ENGA											
Yr 5											
WESTERN	36	18	0	3	11	3	1	8.3%	50.0%	50.0%	100.0%
BVILLE	5	2	0	1	0	2	0	40.0%	40.0%	40.0%	100.0%
GULF											
SANDAUN	0	0	0	0	0	0	0				
NIRELAND	0	0	0	0	0	0	0				
MANUS											
Grand Total	326	150	49	20	18	75	12	23.0%	46.0%	61.0%	99.4%

Annex 8.

Effectiveness of development partner inputs in assisting the NTP to strengthen TB/MDR-TB services in the PNG

The main partners supporting the NTP to strengthen TB/MDR-TB services in Papua New Guinea are: World Vision International (WVI), World Health Organization (WHO), AusAID, Jane Thompson and Associates Inc. (JTAI), and Hope World Wide (HWW).

Papua New Guinea has a TB grant from the Global Fund to Fight AIDS, TB and Malaria in the amount of USD14 Million of which the NDOH was the Principal Recipient (PR) until 2011. In year 5 of the GF grant, while the NDOH was in the process of strengthening its administrative and financial systems, World Vision PNG took on the role of PR for year 5 (October 1, 2011 to September 30, 2012) with an additional No Cost Extension Period of 9 months to be completed by June 30, 2013.

The grant has 4 Sub-recipients: JTAI, HWW, WVI and WHO. JTAI implements two core components of the TB programme: under the GF grant: monitoring and evaluation (M&E) and Procurement and Supply Chain Management (PSM). The NTP, in collaboration with these GF-supported partners, has made below-mentioned achievements:

- By the middle of 2012, all 22 provinces have started to implement the DOTS strategy (access to Fixed dose combinations (FDCs) from GDF, functional R & R, etc).
- 5.5 million Papua New Guineans had access to TB services in 2012.
- 1248 clinicians and 2570 community members were trained across the country from 2006 to September 2012.
- About 110 GF-funded staffs supported the TB program at district, provincial and central level.
- Availability of ME/PSM officers at the provincial level has improved substantially TB case notifications.
- 73 laboratories were developed to have the capacity to conduct sputum smear microscopy services based on ZN staining method.
- 187 TB microscopists were trained from 2008 to September 2012.
- DRS protocol has been developed, 4 provinces have been selected to participate in the DRS (trainings, planning meetings have been conducted, Xpert and reagents have been procured and distributed)
- TB protocol, MDR-TB guidelines, TB/HIV collaborative activities guidelines and TB strategic Plan 2011-2015 have been developed.
- MDR-TB training was conducted
- Programmatic management of MDR-TB in 4 provinces started.

AusAID

- Financially supports the DRS in Papua New Guinea and has made available USD400 000 for that.
- At the national level, has started to co-finance the WHO TB medical officer to provide technical assistance to the NTP until 2016.
- At the provincial level, provided AUD11 Million to the TB programme of the Western province of the Papua New Guinea.

- In December 2012, committed additional AUD20 Million for the Western Province of Papua New Guinea to be used for infrastructure improvements.
- Signed the agreement with the World Vision International (WV) to support the TB program in the Western Province until 2015 USD2.9 Million for three years).
- Provided Medic Queen (boat) for outreach of coastal activities, to transport of patients/sputum samples to Daru hospital of the Western province, and also purchased a new digital X-ray machine and laboratory equipment including an X -pert unit for Daru.
- Supports the constructing of a new TB unit at Daru General Hospital which is on track for completion by mid-February 2013. Once complete, it will provide six isolation beds, and a 16 bed TB ward.
- Supported the deployment of a TB Medial Officer, TB Program Coordinator, three nurses and two Community Health Workers to help improve TB services in Western Province, through World Vision.
- Established the Communications Centre at DGH in Dec 2011. The Centre uses the existing health radio network, and AusAID has also supported provision of Blackberries to key TB Program staff.
- World Vision is on track to train 50 volunteer Community Treatment Supporters and 25 Community Health Workers in South Fly by the end of 2012. A total of 75 Community Health Workers and 200 community treatment supporters will be trained across Western Province by mid-2015.
- At the request of the PNG Government, AusAID will support the recruitment of an additional PNG medical officer to provide inpatient TB care in Daru. The new medical officer will report to the specialist TB physician at Daru Hospital, allowing his role to focus on outreach and supervisory activities.
- AusAID will support recruitment of three TB Disease Control Officers (DCOs) to expand coverage at BMUs (Balimo, and Kiunga) in Western Province. These positions will work under the Provincial TB Coordinator, employed through World Vision. All positions have been advertised.

- **Contribution of investments made on the development of TB/MDR-TB services in PNG on overall health systems strengthening.**

Papua New Guinea has a decentralized health care system under the Organic Law on Provincial and Local Level Government 1995 where management of essential public services is the responsibility of the local government. Uncoordinated and fragmented health services and weak capacity of the local governments are major challenges in achieving improved health care delivery.

Deployment of more than 100 GF funded posts at provincial and district levels improved the TB case detection , monitoring and evaluation and drug delivery to the peripheral health facilities. However, with the closure of GF round 6 grant, contracts of GF funded staff are expiring, and very few provinces expressed their willingness to absorb the staff into their system.

In addition to that, NTP's PSM and M& E functions have been "outsourced " to the GF-funded Sub-Recipient, and with the closure of the GF round 6 grant, NTP will not be able to conduct its basic functions.

AusAID is supporting the constructing of a new TB unit at Daru General Hospital which is on track for completion by mid-February 2013. Once complete, it will provide six isolation beds, and a 16 bed TB ward.

A Master Plan for Daru General Hospital will be completed by April 2013 to assess existing facilities and options for upgrading facilities. This will include an assessment of services to be provided, demographics, future health trends, and capital and recurrent costs and development of an implementation strategy. Further scoping work will be completed for the Outpatients and Services Block for Daru General Hospital, comprising the outpatients area, laboratory, operating theatres, and pharmacy. AusAID is providing funding for the development of the Master Plan for Daru General Hospital, as well as the scoping works for the Outpatients and Services Block. The tender for this work was released on 12 November 2012.

Subject to the priorities identified in the Daru General Hospital Master Plan, AusAID will commit additional funding to support new infrastructure.
Funding has been secured through the PNG Sustainable Development Program (PNGSDP) for staff housing at Daru General Hospital. Daru General Hospital, Western Province Health Office (WPHO) and PNGSDP will need to reach an agreement on the location of staff housing.

The Middle and South Fly Health Development Program (MSFHDP) will prioritize in-service training, health infrastructure refurbishment and staff housing to help attract and retain staff to rural areas. Infrastructure will be built to PNG National Health Standards, and include water and sanitation. The USD37 million (PGK80 Million) MSFHDP will be co-financed by AusAID, Papua New Guinea Sustainable Development Program and Ok Tedi Fly River Development Program, for 5 years from 2013.

AusAID is taking a two-track approach of supporting development of TB services, together with broader support to improve Primary Health Care services in Western Province. However, Primary Health Care outcomes will require longer timeframes, and can only be achieved through multiple inputs, significant funding, as well as strong and sustained management, commitment and leadership by the Papua New Guinea Government.

Annex 9
Smear microscopy centers (SMC: population ratio)

Province	Districts	Population	# Health Facilities	# SMC's	SMC: population ratio
Morobe		**691596**	**49**	**10**	1:69,159
	BULOLO	99023	7	1	
	FINSCHAFEN	58065	7	1	
	HOUN-GULF	76317	4	1	
	KABWUM	53700	4	0	
	LAE	152804	10	1	
	MARKHAM	63298	3	2	
	MENYAMYA	87886	5	2	
	NAWAE	44951	3	1	
	TEWAE-SIASSI	55552	6	1	
Madang		**476566**	**47**	**10**	1:47,656
	BOGIA	73002	8	3	
	MADANG	110829	9	3	
	MIDDLE-RAMU	N/A	8	N	
	RAI COAST	1890	7	1	
	SUMKAR	1615	7	2	
	USINO-BUNDI	3053	8	1	
East Sepik		**417428**	**44**	**1**	1:417,428
	AMBUNTI – DREIKIKIR	67382	9	N	
	ANGORAM	83680	10	N	
	MAPRIK	70312	6	N	
	WEWAK	77804	9	1	
	WOSERA – GAWI	60097	6	0	
	YANGORU-SAUSSIA	58152	4	N	
West Sepik		**229936**	**36**	**6**	1:38,322
	AITAPE-LUMI	66084	8	2	
	NUKU	56971	9	N	
	TELEFOMIN	44055	7	2	
	VANIMO-GREEN RIVER	62827	12	2	
Manus		**54662**	**13**	**1**	1:54,662
	LORENGAU	54662	13	1	
New Ireland		**153076**	**30**	**1**	1:153,076
	KAVIENG	69096	13	1	
	NAMATANAI	83980	17		
East New Britain		**274916**	**31**	**5**	1:54,983
	GAZELLE	112118	9	1	
	KOKOPO	72865	5	2	

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	POMIO	56154	14	1	
	RABAUL	33779	3	1	
West New Britain		**253661**	**32**	**3**	1:84,554
	KANDRIAN - GLOUCESTER	69582	15	2	
	TALASEA	177063	17	1	
Bougainville		**200 2765**	**31**	**5**	1:400,553
	CENTRAL BOUGAINVILLE	47434	4	1	
	NORTH BOUGAINVILLE	82336	13	2	
	SOUTH BOUGAINVILLE	69271	14	2	
Western		**205332**	**41**	**5**	1:41,066
	MIDDLE FLY	74808	12	1	
	NORTH FLY	68193	17	3	
	SOUTH FLY	62331	12	1	
Gulf		**134678**	**20**	**3**	1:44,893
	KEREMA	82519	14	2	
	KIKORI	52159	6	1	
Central		**225766**	**38**	**6**	1:37,628
	ABAU	47094	5	2	
	GOILALA	33555	8	0	
	KAIRUKU – HIRI	96676	18	3	
	RIGO	48441	7	1	
NCD		**349415**	**16**	**9**	1:38,824
	MORESBY NORTH EAST		5	5	
	MORESBY NORTH WEST		4	1	
	MORESBY SOUTH		7	3	
Milne Bay		**262776**	**41**	**11**	1:23,889
	ALOTAU	93220	16	2	
	ESA'ALA	53257	10	3	
	KIRIWINA-GOODENOUGH	62401	7	3	
	SAMARAI-MURUA	53898	8	3	
ORO		**169121**	**19**	**3**	1:56,374
	IJIVITARI	86394	12	1	
	SOHE	82727	7	2	
South.Highlands		**791066**	**72**	**7**	1:113,009
	IALIBU-PANGIA	73564	5	1	
	IMBONGGU	87013	6	1	
	KAGUA – ERAVE	78945	9	N	
	KOMO – MARGARIMA	92915	10	2	
	KOROBA – KOPIAGO	100754	13	N	

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	MENDI	139619	8	0	
	NIPA-KUTUBU	142649	14	2	
	TARI	75607	7	1	
Enga		**381598**	**32**	**6**	1:63,600
	KANDEP	61308	5	N	
	KOMPIAM – AMBUN	57340	9	2	
	LAIGAP-PORGERA	117703	7	2	
	WABAG	75988	4	1	
	WAPENAMANDA	69259	7	1	
Hagen		**549531**	**42**	**9**	1:61,059
	ANGALIMP - SOUTH WAHGI	120603	8	2	
	BAIYER – MUL	70 793	4	1	
	DEI	62152	5	1	
	HAGEN	108590	5	2	
	JIMI	46689	7	1	
	NORTH WAHGI	64745	5	1	
	TAMBUL – NEBILYER	75960	8	1	
Eastern Highlands		**526645**	**36**	**10**	1:52,664
	DAULO	37658	4	1	
	GOROKA	87419	4	2	
	HENGANOFI	67833	4	1	
	KAINANTU	111626	3	1	
	LUFA	55791	4	1	
	OBURA-WONENARA	36111	11	3	
	OKAPA	75463	4	1	
	UNGGAI-BENA	54743	2	0	
Simbu		**307641**	**31**	**1**	1:307,641
	CHUAVE	42733	3	0	
	GUMINE	42617	3	0	
	KARIMUI-NOMANE	43041	6	0	
	KEROWAGI	64975	8	0	
	KUNDIAWA	69244	7	1	
	SINASINA-YONGGAMUGL	45032	4	0	
TOTAL		6,290,466		112	1:56,164

Annex 10
Laboratory workload statistics in CPHL, Angau Hosp Lab, DGH Lab

WORKLOAD STATISTICS 1 QUARTER 2012 TB LABORATORY CPHL						
Reason for examination	*Patients*			*Specimens*		
	No. tested	*No. positive*	*% positive*	*No. tested*	*No. positive*	*% positive*
Diagnosis	*1059*	*238*	*22*	*2,585*	*557*	*22*
Follow-up	*246*	*54*	*22*	*498*	*96*	*19*
Not-stated	*116*	*25*	*22*	*242*	*41*	*17*
Total	*1421*	*317*	*22*	*3,325*	*694*	*21*

WORKLOAD STATISTICS 2011 ANGAU MEMORIAL GENERAL HOSPITAL						
Reason for examination	*Patients*			*Specimens*		
	No. tested	*No. positive*	*% positive*	*No. tested*	*No. positive*	*% positive*
Diagnosis	*2752*	*817*	*30*	*7886*	*1702*	*22*
Follow-up	*1183*	*257*	*22*	*2351*	*317*	*13*
Not-stated	*30*	*0*	*0*	*0*	*0*	*0*
Total	*3965*	*1074*	*27*	*10237*	*2019*	*20*

WORKLOAD STATISTICS 1/2/3 QUARTER 2012 ANGAU MEMORIAL GENERAL HOSPITAL						
Reason for examination	*Patients*			*Specimens*		
	No. tested	*No. positive*	*% positive*	*No. tested*	*No. positive*	*% positive*
Diagnosis	*1977*	*425*	*21*	*5240*	*999*	*19*
Follow-up	*787*	*140*	*18*	*1570*	*259*	*16*
Not-stated	*4*	*0*	*0*	*0*	*0*	*0*
Total	*2768*	*565*	*20*	*6810*	*1258*	*18*

WORKLOAD STATISTICS 2011 DARU GENERAL HOSPITAL						
Reason for examination	*Patients*			*Specimens*		
	No. tested	*No. positive*	*% positive*	*No. tested*	*No. positive*	*% positive*
Diagnosis	*471*	*133*	*28*	*1272*	*332*	*26*
Follow-up	*260*	*79*	*30*	*497*	*103*	*21*
Not-stated	*0*	*0*	*0*	*0*	*0*	*0*
Total	*731*	*212*	*29*	*1769*	*435*	*25*

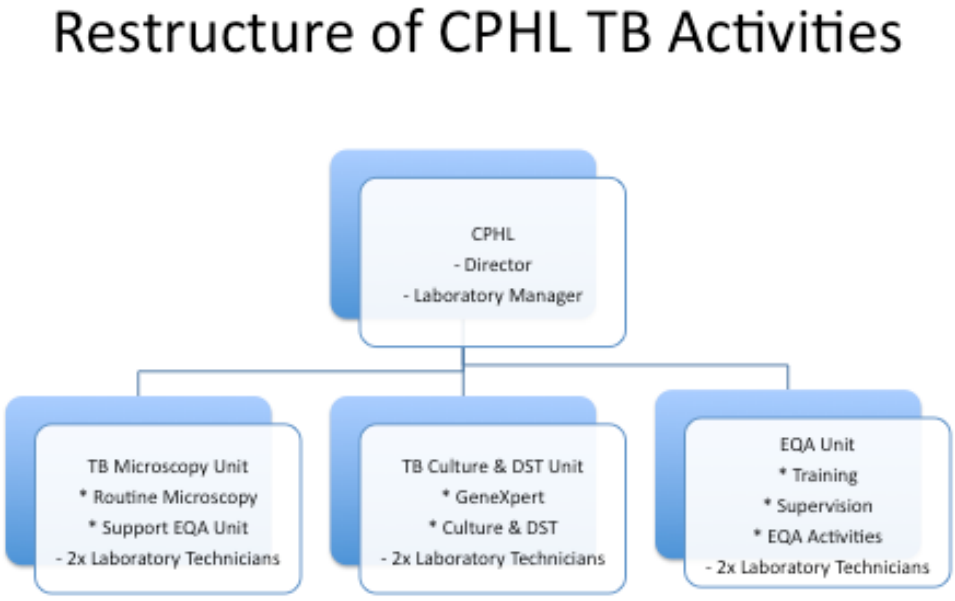
Annex 11

GeneXpert pilot results in CPHL and DGH (since Apr, May 2012)

Reason for examination	GeneXpert MTB/RIF CPHL					
	MTB NOT DETECTED	MTB DETECTED RIF NOT DETECTED	MTB DETECTED RIF DETECTED	MTB DETECTED RIF INDETERMINATE	ERROR	TOTAL
Diagnosis	19 (20%)	55 (58%)	12 (13%)	0	9 (9%)	95
Follow-up	3 (12%)	12 (48%)	9 (36%)	0	1 (4%)	25
Not-stated	57 (32%)	72 (40%)	36 (20%)	4 (2%)	10 (6%)	179
Total	79 (26%)	139 (46%)	57 (19%)	4	20 (7%)	299

In DHG, testing with GeneXpert started in May 2012. According to the excel list with results revised during the visit, 178 tests had been done, with 93 Rif-sensitive, 51-Rif resistant, 11 with error and 23 without result.

Annex 12
Proposed restructuring of CPHL activities



Annex 13
Drug inventory
Red fonts represent drug stockouts

Central level:

BADILI WAREHOUSE, PNG				
Drug	**Preparation**	**Expiry**	**Stock (at least/minimum)**	**Manufacturer**
FLDs				
FDC Cat I		4/2014	288 kits	Through GDF
FDC Cat II		1/2014	264 kits	
Loose drugs: R, Z, E		*No physical count done*		*Various manufacturers*
SLDs				
Capreomycin (Preomycin)	1 gram	3/2015	3,800 vials	North China Pharma, Grp. Co., China
Kanamycin (Kanamac)	1 gram	9/2013	3,850 vials	MacLeods Pharma, Atlant Arcade, Baddi, DSH Solan
		11/2013 (5/2015 - H20)	2,400 vials	
Ofloxacin	200 mg tab	6/2013	168,000 tabs	BDH Industries Ltd, India
Ethionamide	250 mg	6/2015	1,800 tabs	MacLeods Pharma, Mumbai, India
Cycloserine	250 mg	4/2014	1,200 tabs	BDH Industries Ltd, India
		4/2014	3,000 caps	United Biotec Ltd, Baddi, Solan Dist.
Clofazimine	100 mg	9/2014	260,000 tabs	Smith and Kenner, India

Provincial level:

MOROBE PROVINCE – FLDs			
Drug	**Expiry**	**Stock**	**Manufacturer**
FDC Cat I	4/2014	24 kits	GDF - Sandoz Pvt Ltd, India
FDC Cat II	1/2014 2/2013-water	12 kits	
Pediatric FDC – intensive phase	**-**	**0**	**-**
Pediatric FDC – Continuation phase	Aug 2013	88 kits	GDF/ MacLeod's
H	6/2014	59,300	Smith and Kenner, India
R	4/2014	34,900	Lupin, India
Z	5/2013	10,900	North China Pharma
E	4/2016	13,100	Lupin, India
S	5/2014	100 vials	Abbott, India

BMU level
Mabuduan BMU: The kits (Cat I) for the patients on treatment were kept on the desk of the CHW, while 3 extra Cat I kits were kept in the drug room, expiry date March 2013. In a separate box there were a number of single drugs: Ethambutol 400mg 1300 tabl, exp 4/2016, Isoniazid 100mg exp 3/2014, Pyrazinamide 500mg exp 5/2013, Rifampicin 150mg 1000 tabl, exp 11/2014. Pyridoxine 25mg 2000 tabl, exp 11/2013. There were no pediatric FDC but there were no pediatric cases.

BADILI URBAN CLINIC- FLDs			
Drug	**Expiry**	**Stock**	**Manufacturer**
FDC Cat I	4/2014	21 kits	GDF - Sandoz Pvt Ltd, India
FDC Cat II	**-**	**0**	**-**
Pediatric FDC – intensive phase	**-**	**0**	**-**
Pediatric FDC – Continuation	6/2013	12 kits	GDF/ MacLeod's

phase			
Loose H, R, Z, E	Available but no physical count done.		

BUTIBUM BMU –FLDs				
Drug	**Preparation**	**Expiry**	**Stock**	**Manufacturer**
FDC Cat I	**-**	**-**	**0**	**-**
FDC Cat II	**-**	**-**	**0**	**-**
H	100 mg	Jun 2014	59,300	Smith and Kenner, India
R	150 mg	Apr 2014	34,900	Lupin, India
Z	500 mg	May 2013	10,900	North China Pharma
E	400 mg	Apr 2016	13,200	Lupin, India
S	1 gram	May 2014	100 vials	Abbott, India

Hospital:

PMGH TB CLINIC – FLDs (does not include drugs in the wards)				
Drug	**Preparation**	**Expiry**	**Stock**	**Manufacturer**
FDC Cat I		4/2014	15 kits	GDF - Sandoz Pvt Ltd, India
FDC Cat II	**-**	**-**	**0**	
Pediatric FDC – intensive phase	**-**	**-**	**0**	
Rif caps	150 mg	3/2015	4100 caps	North China Phama grp Coop, China
Ethambutol (Combutol)	400 mg	4/2016	3200 tabs	Lupin Ltd, India
Pyrazinamide	500 mg	5/2013	800 tabs	North China Pharma, Grp. Co., China

PMGH TB CLINIC –SLDs (does not include drugs in the MDR ward)					
Drug	**Preparation**	**Expiry**	**Stock**	**Patient months**	**Manufacturer**
Capreomycin sulfate	1 gram	7/2013	320vials	*Cannot be determined. The exact no. of patients currently on MDR treatment is unclear.*	North China Pharma, Grp. Co., China
Kanamycin (Kanamac)	1 gram	9/2013	520 vials		MacLeods Pharma, Atlant Arcade, Baddi, DSH Solan
Ofloxacin	200 mg tab	3/2015	2000 tabs		BDH Industries Ltd, India
Ethionamide (Tumid)	250 mg	11/2013	1800 tabs		Samarth Life Science Pvt, Ltd, India
Cycloserine	**-**	**-**	**0***		**-**

* The MDR-TB Ward also had stock-out of Cs.

ANGAU HOSPITAL MDR WARD – SLDs *Note: FLDs not checked due to time constraint*					
Drug	**Preparation**	**Expiry**	**Stock**	**Patient months**	**Manufacturer**
Capreomycin sulfate (Kadocin)	1 gram	3/2013	366 vials	0.87*	MacLeods Pharma Ltd, India
Ofloxacin (Oflostar)	200 mg tab	6/2013	9900 tabs	5.9 mos	Cadilla Pharma Ltd, Industrial Growth Center, Samba
Ethionamide (Ethomid)	250 mg	6/2015	2800 tabs	3.3 mos	MacLeods Pharma Ltd, India
Cycloserine (Cyclotec)	250 mg	4/2014	2150 tabs	2.6 mos	United Biotec Ltd, India

*Assuming all 14 patients were on Cm. It was not clear how many were on Cm.

Site visit report of Daru (See Annex 2)

ANNEX 2

14.1.2013

INPUT TO PAPUA NEW GUINEA TRAVEL REPORT
VISIT TO DARU, NOVEMBER 2012

1. PURPOSE OF MISSION

A mission was conducted from 23 to 30 November 2012 by a team from WHO/WPRO with the following terms of reference:

In collaboration with national authorities in Papua New Guinea:

1. To assess implementation of programme activities required for the proper detection and management of PMDT;

2. To review progress in implementation of recommendations from the previous TA mission on PMDT; and

3. To assess the effectiveness of all development partner inputs in assisting the NTP to strengthen TB/MDR services in Papua New Guinea.

2. BACKGROUND

The team visited Papua New Guinea in light of its reported inadequate implementation of TB control in South Fly district with high levels of MDR-TB. Australia, on the other hand, is concerned about Papua New Guinea citizens gaining access to health services from the Australian side at the same time to provide support to strengthen TB control.

WHO visited South Fly in October 2011 to provide recommendations. Since then, TB control has been strengthened and TB patients from Papua New Guinea on treatment on the Australian side have been handed over to Papua New Guinea.

3. ACTIVITIES AND FINDINGS

The mission visited Daru Hospital, provincial and district health authorities and Mabuduan Health Center (see list of persons met).

3.1 Organization and funding

The Western Province (population approximately 220 000) is one of the sites trialling a provincial health authority. The administrative centre for Western Province is in Kiunga, North Fly, but construction is under way to house the provincial administration in Daru, South Fly. The provincial health administration has its own office in Daru. There are different partners and different sources of funding for health and tuberculosis in the province and district.

Regular NDOH funding for the province and district includes salaries and drugs. For TB operations, the province had provided PGK100 000 for TB work in each district. According to the provincial health administration, districts had partly used the funding for other purposes. In 2013, the funds will be controlled by the province. Another PGK50 000 was available from the national health function grant for each district for supervision, medical supplies and facility maintenance, based on an annual activity plan.

There is no provincial disease control officer in Western Province. In the three districts, the district disease control officer is not functioning in North, inactive in Middle Fly and vacant in South Fly (although recently a new person has assumed this position). The provincial TB Program Coordinator (AusAID-funded) is based in Daru Hospital. The positions for the three district TB coordinators (North, Middle and South Fly) are currently not filled. These are now being advertised and the positions will be funded by AusAID.

AusAID has committed USD31 Million to help support the Government of Papua New Guinea to detect and treat TB in Western Province: USD11 Million over four years for provision of TB specialist staff, training for community health workers and volunteer treatment supporters, medical equipment, drugs, a sea ambulance, and funding for high level laboratory diagnosis in Australia of drug resistant TB, with work underway for a new TB isolation ward. An additional USD20 Million over five years will be provided, including up to USD10 Million, for the rehabilitation of Daru Hospital; up to USD5 Million for the rehabilitation of the Mabaduan Health Centre, which is less than five kilometres from Queensland's Saibai Island; and, USD5 Million contribution to support the Middle and South Fly Health Development Program, which is a USD37 Million initiative jointly-funded by the Ok Tedi Fly River Development Program and AusAID. Support is also provided to the Global Fund to Fight AIDS, TB and Malaria (paragraph from AusAID homepage 19 December 2012).

The Australian funding for the TB project in South Fly started in April 2012 and has set up a TB communications room in Daru Hospital, with staff including the TB doctor attending TB and MDR-TB patients in Daru Hospital, the provincial TB coordinator, administration and communications officer, the World Vision Representative and staff focusing on community work. Recruitment is ongoing for another medical officer for Daru Hospital to assist the TB doctor.

The equipment provided to Daru Hospital include a GeneXpert machine for rapid diagnosis of TB and Rifampicin resistant TB, a digital x-ray, laboratory equipment for biochemistry and a new TB isolation ward, which is under construction. The sea ambulance "Medics Queen" facilitates outreach activities and travels of TB suspects and TB patients living in communities outside Daru Island. Eight microscopes have been provided, some solar. AusAID also ensured prepaid phone cards and blackberry. Mobile phone has access in selected sites including Daru and Mabuduan. The TB

project ensures systematic supervision travels to the communities and training of peripheral health centres and Aid Post staff.

The Global Fund, with World Vision (WV) as PR, no longer includes Western Province among its target provinces, but provides one ACSM coordinator in each province that covers M&E, drug supply and supervisory visits, all outsourced to JTAI. In Western Province, the M&E officer is placed in Kiunga (North Fly) since April 2012, covering also Middle Fly, but not South Fly. According to JTAI, South Fly was not included since the TB project team there covers M&E, while the TB team in Daru stated that they wanted the M&E person to be based in Daru as they felt that they needed support. JTAI has only been operating in the last six months after one year delay of funding from the GF.

Since the GF is expected to end in March 2013 (although there is a possibility for a no cost extension for some additional months), the M&E officers will no longer have funding. No exit plan was available at the time of the visit. WV is supported by AusAID for clinical response in South Fly, including outreach activities and default tracing.

The NDOH has contracted Dr/Mr Marin Joseph as the new Chief Executive Officer of Daru Hospital, who arrived a few weeks before the mission.

In the revised health system, the provinces and districts have increased responsibility for funding health activities but this is not yet fully functional. During the mission, the provincial health authorities expressed serious concerns about the general drug supply system (see below).

The same concerns about the drug supply system were raised by the district health authorities. The district health authorities in Daru have their own office building, but no transport is available. Since three months, the district team includes an experienced disease control officer who is making supervisory visits to the rural mainland communities, partly with the sea ambulance and partly on foot. The disease control officer demonstrated an excellent knowledge of the mainland TB control challenges. He had previous experience with TB control in the capital.

Both the provincial and district health authorities expressed that there was a general lack of coordination and information sharing about the TB control efforts being implemented by the different partners. There is a steering committee of the health programme in the Western Province which had held four meetings so far but the last one was six months ago. There is also a provincial implementation plan (AIP) towards full provincial access to quality diagnosis and treatment of TB. Therefore, the partners agreed during the debriefing meeting that regular meetings were needed, if only to agree on the travel schedule of the sea ambulance and the coordination of activities. It is noteworthy – and regrettable - that the AUSAID-funded Daru Hospital-based TB Project Team never ever visited the District Authorities before. Hence, both sides did not know what the other was doing/planning.
The mission team insisted on meeting the district health authorities and the outcome was encouraging, and the opportunity was used to share plans and experiences and involve the new district disease officer in the field visits.

Also, coordination within Daru Hospital could be strengthened. Both the mission and the TB project team signalled that it seems as if Daru Hospital staff perceives TB diagnosis and

treatment as a separate project, and not as an integrated part of the regular hospital work where all staff have a responsibility. At the same time, all staff and patients should benefit from equipment that was procured under the TB project. This is particularly true for the X-ray and the laboratory equipment. The new hospital Director already identified and started to address these issues.

The health center visited by the Team Mabuduan is an hour and a half from Daru in the sea ambulance and has 10 aid posts in the catchment area. The building is old and rundown and a new building will be constructed nearby as soon as all administrative arrangements have been completed. The health center employs staff, of which only one – a community health worker – was present. There are two other saff - a nursing officer and another CHW – but were not available.

The Project is making efforts to scale up smear microscopy capacity in mainland South Fly. Currently there are two microscopy centers, in Mabaduan and Morehead. Other centers are being trained and integrated supervision (malaria, TB and HIV) is being prepared. Although loose drugs have been replaced by fixed-dose combinations in most centers, there are still single drugs in use in some inland health posts and many patients start treatment without sputum smear examination. It is urgent that the TB project ensures that diagnosis by smear microscopy is available throughout the district and province, and that all treatment is provided with DOT. In reality, only one AusAID-funded staff drives this major project to establish and strengthen rural South Fly ambulatory services (Abel Morome). The progress made is really impressive but clearly he needs more assistance to accelerate efforts.

Recommendations:

- All partners should strengthen coordination and collaboration between organizations involved, using the provincial implementation plan (AIP) to work jointly towards full provincial access to quality diagnosis (microscopy network) and treatment of TB. In order to strengthen sustainability of TB prevention and control, the NDOH provincial and district levels should be fully involved – and if possible - take key roles in planning and implementation;

- Roles and responsibilities of all partners need to be clarified (further) in order to ensure complimentary efforts are aligned and 'in phase';

- Ensure that Daru Hospital takes stronger ownership of its TB programme; and

- Strengthen human resource capacity to implement the programmatic interventions, training and supervision especially for microscopy scale up.

3.2 Drug supplies

NDOH has outsourced its general drug distribution to LD Logistics. There are currently four different distribution systems: LD logistics, Post Papua New Guinea, Panacea and through the TB programme.

The provincial health authorities were concerned that they were not informed by the private drug distribution company (LD Logistics) about distribution of drugs to districts and health facilities. Drugs were supposed to be delivered every two months but this year there had been delays from four to six months.

The district health authorities had observed that drugs had been shipped to non-functioning health facilities and left at sites where they had not been picked up. Both provincial and district health services wanted a return to the drug distribution system some years back when they were directly involved in distribution to the facilities.

For TB drugs in the Western Province, the M&E officer (also taking care of drug management) is placed in Kiunga (North Fly) since April 2012, covering also Middle Fly, but not South Fly. The TB team in Daru Hospital, therefore, manages supply of TB drugs for South Fly.

First line FDCs have been gradually introduced in Western Province since October 2011 as staff have been trained. Few health centres, however, have still not started FDCs but the last staff was trained in October 2012 so the remaining facilities will soon start.

Second line drugs are partly supplied from the NDOH with other TB drugs, and partly supplied from Australia (covered year two of patients on treatment in Daru). Australia has also promised to cover the necessary third line drugs (Group 5 drugs) for the treatment of XDR patients.

In Daru Hospital, TB drugs, both first and second-line, had been regularly supplied during the last year. The district quarterly TB report includes a section for drug request, stating current stocks. Daru has also provided TB drugs to Middle Fly since transport from Port Moresby has been a problem. The TB drug request is supposed to be based on the number of cases, but it seems that distribution is usually based on previous consumption.

In Daru Hospital, TB drugs for South Fly District were kept in a room adjacent to the TB communications room. Current stocks could not be observed (lack of time because return flight suddenly left two hours ahead of planned schedule).

The Mabuduan Health Centre visited had adequate stocks of essential general drugs since supplies were received in September. The well-organized storage room now contains supplies of antibiotics, anti-malaria drugs, salbatumol, nystatin, promethazine and drugs to treat leprosy. This represents a major change as no drugs were available during last year's mission. TB drugs were kept with the other drugs in the storage room. The kits for the patients on treatment were kept on the desk of the CHW, while three extra kits were kept in the storage room, with an expiry date of March 2013. In a separate box, there were a number of single drugs, namely: Ethambutol 400mg 1300 tabl, expiring 4/2016, Isoniazid 100mg expiring 3/2014, Pyrazinamide 500mg expiring 5/2013, Rifampicin 150mg 1000 tabl, expiring 11/2014, and Pyridoxin 25mg 2000 tabl, expiring 11/2013. All the loose drugs (except some INH and pyridoxine) and extra kits were brought back to Daru to prevent inadequate use and expiry.

Recommendation:

- Strengthen logistics for drugs (general and TB), ensuring that provinces and districts are involved in planning and distribution; and

- Ensure that TB first-line drug supply is based on the number of TB cases registered during the previous quarter and on the actual stock levels. TB drug stocks should only be needed in facilities starting TB treatment, while the rest will receive drug kits for each patient once they are arrive for treatment. Continue to retrieve loose drugs from the health facilities.

3.3 Diagnostics/laboratory

TB suspects presenting in the OPD in Daru Hospital are given a sputum cup and asked to come back the next day with a sample, when a second sample will be collected. The laboratory performs smear microscopy (ZN) and also, since May 2012, tests smear positive cases with GeneXpert. The TB suspect register in the OPD indicated that many suspects entered did not have a laboratory result and that the number of TB suspects studied in the laboratory was twice the number in the TB suspect register, thereby, suggesting that some TB suspects are not going to the laboratory; that the TB suspect register is not complete; and that some TB suspects come through other channels, such as hospital wards. The high proportion of sputum samples marked as saliva or scanty indicates that the quality of sputum can be improved.

In Daru Hospital, there was an Olympus microscope with very clear colors in a positive slide inspected. Quarterly laboratory results were available. EQA of microscopy had been done in 2011 but the document with the results was not available. The samples had recently been sent for EQA for the first three quarters of the year to the national reference laboratory, and no result had been received yet.

There were two more microscopy centres in the district, in Mabuduan and Morehead Health Centers, but an EQA system has not yet been established. In Mabuduan Health Center, very few TB suspects had been investigated since smear microscopy has started only some months earlier and apparently the technician did not yet feel confident. Therefore, the centers inform Daru TB project when suspects have been identified and sputum should be picked up for analysis in Daru Hospital. This seems to work well thanks to improved sea transportation modalities.

TB suspects were also identified during outreach activities. Outreach activities to communities (including smear microscopy) have assessed 250 suspects, and 29 were found with TB. In Mabuduan, 18 out of 80 suspects were found with TB, one with MDR-TB.

The TB suspects were supposed to have sputum examined in the laboratory of the health centre, or sputum collected and transported to Daru Hospital for microscopy. TB suspects presenting to the health facilities on the Australian side were supposed to be transported to Daru Hospital for diagnosis.

The Xpert machine for the rapid (2-hour) diagnosis of rifampicin resistance (indicating likely MDR-TB) was installed in a separate room in the Daru Hospital laboratory. There were air conditioning and a fridge in the laboratory. Testing started in May 2012, and by the time of the visit, 178 tests had been done, with 93 Rif sensitive, 51 Rif resistant, 11 with error and 23 without result. There were 90 cartridges still to be used, with expiry date of 17 February 2013. The findings justify the use of Xpert in all smear positive TB patients, HIV positive patients, positive follow-up smears of patients on first line treatment, previously treated patients and MDR-TB contacts. Clearly, the introduction of GeneXpert has been a huge improvement in expanding MDR-TB diagnosis and reducing diagnostic and treatment delay. The latter contributes to reduction of early death and default. .

Daru Hospital sends sputum for culture and first and second line DST to Queensland with the help of the corporate sector (a lobster company flights). However, these flights depart very irregularly, so delay may happen up to four weeks. Comparing smear and culture results in samples tested with GeneXpert found a large proportion with positive smear and negative culture, suggesting that delay in shipment caused contamination and problems to detect viable TB bacilli. The TB team is, therefore, preparing to send cultures with a flight from Tabubil in

North Fly, a mining community where flights are more frequent, which passes through Daru. The turnaround time for culture and DST results in Australia may be from four to ten weeks.

The TB team was waiting for the DRS to start. Unfortunately, there was insufficient time to discuss and review the details of the DRS pilot.

3.4 Preliminary data from the TB suspect register in Data on TB case finding

Daru Hospital OPD from the second and third quarters of 2012 indicate an impressive increase in number of TB suspects identified (Table 1). The TB laboratory register for smear microscopy also showed a significant increase in TB suspects, with an 86% increase from the first three quarters in 2011 to the same period in 2012, while the positivity rate declined from 31 to 23% (Table 2). The increase in TB suspects was especially impressive from the second to the third quarters in 2012. The positivity rate declined but is still very high indicating that many TB suspects are detected too late and that access to diagnosis must be further improved.
The number of TB suspects with results in the laboratory register was more than double the number entered in the TB suspect register, even more than last year suggesting that the TB suspect register is not updated, or that many TB suspects are identified elsewhere, such as, in the wards or in other health facilities (sent from health centers on the main land).

During the second and third quarters in 2012, there were 120 TB suspects with positive smear in the laboratory register, however, only 95 were smear positive cases (new and relapses) notified in the quarterly report, based on the South Fly BMU register, suggesting that not all diagnosed TB cases were reported in the BMU register. The mission was informed that several cases with GeneXpert showing Rif resistance were entered in the PMDT register but not in the BMU register.

According to the quarterly reports based on the BMU register (for South Fly District), the number of TB cases increased significantly in the second and third quarters of 2012 (Table 3). It was striking that only the number of new smear positive and extra-pulmonary cases increased while the other categories did not change much. Still many patients start treatment without smear examination. This may be due to the use of X-ray as a diagnostic tool. The routine use of X-ray could also be responsible for a pre-selection for smear microscopy and, thus, explain the elevated yield of smear microscopy that was mentioned above. However, the proportion of patients without a smear examination seemed to decline in the third quarter of 2012.
The proportion of pediatric TB cases declined from one third to less than 10%. Since more contact tracing is being done, more pediatric TB cases would be expected (and more contacts started on isoniazid preventive treatment).

The notification rate of all TB in South Fly can be calculated to 688 per 100 000, while for new smear positive cases, the rate is 200 (Table 4 below).

Comment: For the whole country, the notification rate of new cases and relapses (all smear results) was 212 per 100 000 in 2011 (WHO Global TB Report 2012). The high notification rate in South Fly cannot be interpreted yet as there are two major possible confounding factors that may be responsible for both over- and under estimation. First, the current TB control efforts result in increased access to TB diagnosis and, thus, TB cases that have been sick for several years are now being identified, resulting in relatively high notification rates that should have leveled off if these prevalent cases were properly treated. On the other hand, there is a second confounder, which drives the rate in the opposite direction. After all, we have to keep in mind that the project has just started scaling up services and that still many 'mainland patients' do not have access to proper diagnosis and/or are not reported. Once 'inland'

South Fly TB patients require access, notification might go up, just as is the case in Daru Island and anywhere else in the world where TB services are being established and strengthened. At this time, it is impossible to assess the burden, but the available data do support the conclusion that we are dealing with a very alarmingly high TB burden.

Table 4: TB Notification rate in South Fly projected for 2012

based on data from first three quarters:

Calculation of notification rate:	All TB	new smear pos TB
All TB cases 1+2+3 quarters 2012	331	96
Adding 4.quarter (*1,33)	440	128
Population South Fly	64000	64000
Rate per 100 000	688	200

3.5 Data on MDR-TB

As mentioned above, according to the Laboratory register for GeneXpert, the rapid diagnosis of MDR-TB started in May 2012. Since then, 178 tests had been done, with 93 Rifampicin sensitive, 51 Rifampicin resistant, 11 with an error result and 23 without result. The category of patient was not filled in for all in the GeneXpert register, so it was not possible to assess the percentage of Rifampicin resistance in new and previously treated patients. Since the results of GeneXpert had not been entered in the BMU register (pending new WHO recommendations), it was not possible to assess how representative those tested were. This was partly due to the very recent introduction of the tool in a high workload situation, but also because GeneXpert inclusion criteria gradually changed (for good reasons).

The number of MDR-TB cases registered is presented for Daru in Table 5, in Australia in Table 6, and in total in Table 7. The total number increased from 31 in the period 2005-2009, to 40 in 2010. According to preliminary data from the PMDT register (including MDR patients from 2011 onwards) compared with the Laboratory register for GeneXpert (since May 2012), and including 33 MDR cases treated and handed over from Australia, the total number of MDR-TB cases was 23 in 2011 and so far 53 in 2012 (until end November). MDR patients registered in Daru increased from 5 in 2009 to 23 in 2010, 13 in 2011 and 53 so far in 2012.

DST data were only available for 22 MDR-TB patients registered in 2012, showing that three of them had XDR-TB with resistance to both Ofloxacin and at least one of the injectable drugs: two out of eight new cases and one out of eight relapses. No MDR-TB case had resistance to only one of the two groups of second line drugs.

In total, 79 TB patients were handed over from Australia. Their place of residence was: Mabuduan - 25, Daru - 21 and 33 from 11 different localities. Of 33 MDR-TB patients handed over, 10 MDR-TB patients are still on treatment.

3.6 Case finding in Mabuduan Health Center

Since October 2011, all new TB patients are referred to Daru for confirmation of diagnosis and initiation of treatment. At the time of the visit, there were eight patients on treatment (all in the intensive phase). In Mabuduan Health Center, the microscope was installed but very few TB suspects had been tested. The laboratory equipment and TB suspect register were lost in a recent burglary that occurred. The room was not safe as there was no proper lock installed. There was no functioning generator; a solar panel was used for the vaccine fridge but smear microscopy was only done with solar light. In the current laboratory register, there were 18 to 19 entries from the fourth quarter of 2011 onwards by quarter: 3-7-1-4-3/4, in total, 15 to 16 TB suspects, so far, in 2012. None of the TB suspects had a positive result according to the CHW but the results were not entered in the laboratory register. The microscopy work load: 16 suspects, so far, in 2012 with an estimated 32 slides, three per month, and none positive. The clinic was quite busy, and could have around three TB suspects per day, 60 per month. The outpatient tally sheet covering nine workdays shows 26 patients with 'simple cough', 48 malaria-related complaints, 11 with diarrhoea, 37 with skin diseases, nine with pneumonia (mostly children) and 93 'other new patients'. The conclusion is that too few were referred for microscopy. In fact, it seems that most suspects are transported to Daru. The team analysed three case histories, involving two women (17 and 18 years old) and one man, aged 20. All three were diagnosed by Daru Hospital. The transport system of specimens and patients that has been set up, including the Medic Queen, ensures relatively efficient diagnostic procedures (with short delays) at a time that the Mabuduan Center still seems hesitant to take on smear microscopy.

Case finding in Mabuduan according to TB register (catchment area approximately 9000 population):

- 2011 4th quarter: 4 patients, all new, 3 pulm, 1 extrapulm. No smear data. Three came from other villages.
- 2012 1st quarter: 5 cases, neither category nor smear result, 2 from other villages.
- 2012 2nd quarter: 5 cases: all cat 1, no smear results.
- 2012 3rd: 6 cases: all cat 1, no smear.

  2012 4th quarter so far: 2 patients: cat 1, both smear positive.

Recommendation on diagnosis and laboratory:

- Ensure that all pulmonary TB cases have a sputum smear result, whether from Daru or from the center;
- Ensure delivery of on the spot sample in the OPD;
- Establish microscopy services in health centers, ensuring that staff are well trained, equipped and supervised including EQA, and that the volume is adequate; and
- Expand the system for detection of TB suspects in the communities and sputum collection systems.

3.7 Infection control

Staff has been trained in infection control, routines have been introduced and patients' rooms have been organized in such a way that smear positive patients are separated from smear negative and confirmed MDR-TB patients from others. Staff were using masks in the infectious zones, but the TB team complained that it was hard to make health staff follow instructions on safety.

The new TB ward which is currently under construction will facilitate infection control further.

The 40 MDR-TB patients who stay in Daru Island after discharge come daily to the ambulatory part of the TB ward , 20% of the patients were still smear positive. The waiting area is basically inside the building and quite crowded, so some 'administrative measures' are needed to reduce the risk of transmission.

According to the regional TB coordinator, more than 20 health staff have developed TB during the last 10 years, but only one worked in the TB ward and developed TB less than three months after starting to work there, suggesting that he was infected earlier. As is the case in many high prevalence settings, health care workers are often infected outside hospital or in other wards where TB awareness is less, patients may remain undiagnosed and infection control is lacking.

3.8 Treatment

Apart from Daru Hospital, the PMDT register is also kept in Kiunga (North Fly) since October 2012, while Balimo Hospital (Middle Fly) sends sputum from MDR suspects to Daru Hospital, since no staff has been trained in PMDT. All TB patients in South Fly District are supposed to start treatment in Daru Hospital. Tabobil Hospital in the mining town near Kiunga will purchase GenXpert soon.

If patients stay in Daru Island, and do not have MDR-TB, they stay for less than one month in the hospital and are then followed up daily by community treatment supporters, until the end of treatment. The visiting team interviewed the community supporters who ensure daily DOT in all susceptible patients in Daru and are linked to specific 'corners' which are settlements of temporary residents from certain mainland villages. Most of the treatment supporters have been working for several years already. They should receive a regular stipend but payment was delayed until late November in 2012. The supporters also do awareness campaigns in the community and collect sputum from TB suspects. The model is being expanded to the mainland. There are now treatment supporters in 11 villages including Daru. The one hour interview showed that all supporters were very well trained, knowledgeable and motivated. One of them was cured from MDR-TB.

If the TB patients live in communities outside Daru Island, they are sent back to their communities if treatment support can be ensured. Treatment support has been ensured by training health staff in a number of health facilities and also by training community treatment supporters. TB drugs for at least two months' use are either picked-up by treatment supporters or sent to TB patients.

For instance in Mabuduan Health Center, a group of TB suspects were identified and sputum sent to Daru Hospital. For those with a positive smear, the TB program organized their travel to Daru Hospital (ambulance boat or banana boat) for treatment initiation, but they

returned to Mabuduan after one to two days, where they were followed up in the health centre on a daily basis, since all lived in the community itself.

The TB ward in Daru Hospital consists of 30 beds divided in four rooms, with 18 patients at the time of the visit. First room with 10 beds for sensitive smear positive TB (4 patients at the visit), Second room (10 beds) for MDR patients with negative smear after one to two months (nine patients), Third room (six beds) for newly diagnosed smear positive MDR patients (four patients), and the Fourth room with four beds now occupied by one MDRTB/HIV+ patient. A new TB ward is under construction.

3.9 Result of treatment of sensitive TB

According to the quarterly reports of treatment outcome based on the BMU register, the success rate of all TB cases was relatively low (65%) during the first three quarters of 2010 compared to the first three quarters in 2011. The success rate increased clearly during the third quarter in 2011 in all three groups (new smear positive, retreatments and others) and reached 78% (Tables 8, 9, 10, and 11). The failure rate was 6-7% of all TB cases for the first three quarters in 2010 and 2011 but showed a small decline in new smear positive cases (from 11 to 10%). Of 255 patients reported during the first three quarters in 2011, 28 (11%) died with TB, a slight increase from those registered during the first three quarters of 2010 when 23 out of 225 (10%) TB patients died. Since all confirmed TB cases should be included when treatment outcome is assessed, also those who died before initiation of treatment should be included.

3.10 Treatment of MDR-TB

According to the PMDT register in 2011, most MDR patients received CmOfxCsEto (some also Z, only one Etb, some only CmOfxCsZ). In 2012, almost all received CmOfxCsEtbZ and at the end of the year, some also PAS and/or Etionamid. The reason for not giving Etionamid in 2012 was that the DST result showed resistance to Etionamid in most patients and colleagues in Queensland strongly advised to omit the drug. This is against WHO recommendations that the DST result should not be used to omit the drug, but that the drug should not be counted as active.

In total, 78 MDR patients were on MDR treatment from Daru Hospital at the time of the visit. Among 53 reported in 2012, so far, 12 are in the TB ward, 37 coming daily to hospital, three died and one was transferred to Port Moresby (Table 11). These results are very promising as patients usually arrive with an advanced stage of disease. The rapid diagnosis by Xpert probably contributes to the improved survival. All 16 patients from 2011 are still on treatment. The mission spoke with two MDR-TB patients they had also met last year and found that these young MDR-TB patients were doing very well. Ten MDR patients handed over from Australia are still on treatment. The only XDR patient admitted stayed in a separate 5-bed isolation ward with opportunity to go outside now and then. He was smear negative at the time of the visit although no culture had been done recently. No treatment was provided to this XDR-TB patient as drug resistance was documented for almost all drugs. The patient was referred from Australia in July 2012 and is now in good shape. Daru Hospital, with assistance from WHO, is exploring the possibility of 'compassionate use' of new TB drugs for MDR-TB that have not yet been registered.

Also, other wards usually have TB patients but because of time constraints the mission did not get information.

Hospital only provides food to in-patients. At the time of the visit, food was scarce with only two meals per day. MDR-TB patients voiced the need for a proper lunch, especially with all the drugs they have to take. The new hospital director agreed to provide lunch and promised to start immediately.

One sensitive TB patient in Mabuduan was told to come to Daru at the end of treatment to have X-ray done. This should not be a requirement.

3.11 Treatment in Mabuduan Health Center and patient interviews

In the last three quarters, all patients come from Mabuduan community. There was no follow up to date on smears in any of the patients. However, all eight on treatment came regularly. One patient had died a few days before. He was in serious condition because he consulted the health services too late.

In total, seven treatment supporters had been trained.

Visits from Daru with ambulance boat come very irregular, approximately every six weeks. But patients can be transported in other small boats if necessary, with costs covered by the TB project.

In Mabuduan Health Center, three of the eight patients were interviewed, all living in the community near the health center:

Female, 17 years of age, and seven other family members, had TB, of which most of them treated on 'the other side'. The patient started with cough and weight loss in June. CHW gave antibiotics but she did not improve. The HCW sent sputum to Daru for smear microscopy and the result was positive. The patient was sent to Daru to start treatment (travel cost paid by TB project). She returned after two days since it was expensive to stay in Daru and treatment could be followed up daily in Mabuduan. There was no result of smear for two months in the card but CHW said it had been tested negative. Patient came very regularly to the health center. At the end of treatment next month, she is expected to go to Daru for an X-ray and sputum follow up examination. She was pregnant with term in few weeks.

A female, 20 years old, with cough and weight loss for one month, after sputum was collected during outreach visit, was found to be smear positive. The patient was sent to Daru to start treatment, but came back after five days. Treatment card did not include smear result, only CHW information.

A male, 18 years old, brother of the first patient, was recently diagnosed. He came to the health center because of cough. A positive smear was found in Daru Hospital, where treatment was started a few days later.

Recommendations Mabuduan:

Fill in TB register and laboratory register properly;

Refer more suspects (or their sputum) for microscopy;

Consider expanding case finding and follow up outside the community center; and

Follow-up TB patients with smears, and enter results.

Recommendation on treatment:

Ensure follow-up after discharge of patients from non-engaged health facilities by identifying, training and following up treatment supporters from these communities;

Ensure that treatment supporters in Daru Island also attend MDR-TB patients, explaining that the risk of infection should not be larger than with sensitive TB. Provide them with N95 masks:

Ensure that Etionamide is included in the regimen even if DST shows resistance, but consider adding PAS;

Ensure sufficient food for the patients during hospitalization in Daru;

Reorganize the waiting lines in the outpatient clinic in the TB ward so that smear positive MDR-TB patients will not infect other patients or staff'; and

Ensure that X-ray at the end of treatment is not a requirement (depends on clinical judgment, in rare cases).

3.12 TB/HIV

The coverage of HIV testing was high but the proportion with positive HIV test is still low: Two were HIV positive out of 40 MDR-TB patients with HIV test result, and six out of 170 all TB cases.

3.13 Recording and reporting/monitoring and evaluation

R&R in South Fly is basically done by the provincial TB coordinator and the TB doctor, while the M&E officer based in Kiunga is not involved. Recording and reporting of basic DOTS seemed to be done well. The district had submitted all quarterly reports based on the BMU register. In Daru Hospital OPD, a laboratory register had been used as TB suspect register since April 2012. The information was being copied into the TB suspect register. Still many of the TB suspects did not have laboratory results entered (Table 1) indicating that the link between OPD and laboratory needed strengthening. The TB Laboratory register for smear microscopy was filled-in properly.

PMDT is managed as follows:

In the new GeneXpert register, the category of patient was not filled-in for all, hence, it was not possible to assess the percentage of Rifampicin resistance in new and previously treated patients. Since the results of GeneXpert had not been entered in the BMU register, it was not possible to assess how representative those tested were.

When the laboratory detects a Rif resistant case (previously when reports came from Australia with result of DST showing MDR), the admission form is filled-in, the patient admitted to the TB ward, drug sheet filled-in, and treatment started. The PMDT register is filled in by the TB doctor or the provincial TB coordinator, and data also entered in an excel sheet kept in the stationary PC in the communications center. The two take copies by memory stick to their PCs when they travel.

Staff had been trained in PMDT including R&R in the capital a year ago (WHO training). However, the new PMDT treatment card has not yet been used since there was no time and it seemed to be complicated. One discussion was that the drug sheet contains information about daily intake of each drug while the PMDT treatment card only contained one box to document whether all the drugs were taken or not that day. A separate sheet (copy of PMDR treatment card) was used for smear, culture and DST results during follow-up.

The handwritten PMDT register since the beginning of 2011 had very scarce information for the 2011 patients (including category of patient) but was more complete for 2012. The date of PMDT registration was the same date in July 2012 for all 2012 patients January-July (when the register was filled-in). To assess MDR-TB case finding, the team, therefore, used the date of DST result but in some cases the date of MDR treatment start when this date was earlier than DST result. Smear and culture data for follow-up were missing in most cases.

Quarterly reports of PMDT had not yet been used. It was a challenge to count accurately how many MDR cases had actually been detected by quarter and year, how many of them had started MDR treatment and to assess preliminary outcome of treatment. The current routines probably create a lot of double work without producing the necessary information the programme managers need for monitoring and strengthening programme performance.

Since routine data are still limited and difficult to analyze, the DRS is urgently needed to clarify the situation of drug resistance.

The TB team in Daru presented the number of TB cases by locality/corner in Daru with the name of the community on the mainland where they come from. Since many patients move from their original community and the respective corner in Daru, it may be possible to assess the total population of the community and the respective corner in Daru, and the number of TB and MDR-TB cases, to identify communities with increased risk.

Recommendations:

Recording and reporting of MDR-TB **urgently** needs strengthening in South Fly, so that the basic tools are used properly and the situation can be routinely and easily assessed. This requires an initial effort but will save time in the long run. NTP/WHO to organize a workshop to strengthen R&R/M&E system both for basic DOTS and PMDT, including how to use data for programme management;

Ensure that all cases detected by Xpert with Rif resistance are included in the BMU register and in the quarterly report on case finding. Their treatment outcome should be failure/Rif resistant started MDR treatment;

Ensure that all confirmed TB cases who default or die **before** the initiation of treatment are included in the BMU register;

Enter into the BMU register data from the GenXpert register (Rif-resistance: R or S) in a column where it can be fitted (for instance the comments column to the right) and also DST results (at least for H, Ofx, Cm and KM (also Am if you have it) received from Queensland, so that patients with resistance to second line drugs can clearly be seen and counted. Then for each quarter **and category** of patient, tabulate

the proportion of patients with result of the Rifampicin resistance test and the proportion with resistance to Rifampicin;

Assess if deaths from TB and MDR-TB are declining in South Fly, both by treatment outcome analysis (by date of TB registration for sensitive cases and by date of treatment start for MDR-TB cases) and by making tables using the date of death, including sensitive TB and MDR-TB separately, and then total;

Start using the MDR-TB treatment card;

Take care to fill-in the dates correctly in the PMDT register: date of PMDT registration, date of DST result, and date of treatment start. This is necessary to be able to count how many MDR-TB cases are detected and registered, how many are started on treatment and to assess treatment outcome (by date of treatment start). ; and

Consider assessing the distribution of TB and MDR cases by "corner" and community, to identify communities with increased risk of TB and MDR-TB. A suggested table: Population, TB and MDR cases by community and corner.

Name of community/ corner	Population		TB cases		MDR-TB cases	
	In corner in Daru	In community on mainland	In corner in Daru	In community on mainland	In corner in Daru	In community on mainland

From the table, the rate of TB per 100 000 population can be calculated, separately in corner in Daru and in community and total of the two. The TB cases can be entered for one year or several years.