"TB epidemiology and responses in Papua New Guinea"
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Introduction:
As commonly understood, TB is one of those diseases imported from outside Papua New Guinea. In the sixteenth century (1526), European Navigators (Portuguese and Spanish) were the first contacts. Then in 1847 first Missionaries came. Early Explorers started entering the territory in 1870s for gold and spice. In 1884 Southern part of New Guinea was under the care of Queensland Government under the Protectorate arrangement by Great Britain, and the Northern part was under German. With more natural resources exploration, more miners and explorers entered the Territory, as in Wau-Bulolo Gold Mine. Then the two World Wars (first occurred in 1921 and second in 1942). These were windows of opportunities where TB could enter the Territory (now called Papua New Guinea).

There is no real record of first TB case diagnosed and/ or treated in Papua New Guinea. However, between 1960s and 1970s, TB cases were managed in the Sanatoria, in the coastal areas, as in Port Moresby (where first European contact occurred).

First anti-TB treatment was introduced in 1974/1975. There were 2-regimens used, with drugs such as Thiacetazone, Isoniazid and Streptomycin (12-18 months). Then in 1984, first paediatric short-course chemotherapy (6 to 9 months) were introduced, followed by introduction to the adult patients in 1989, and was later rolled-out to the rest of the country.

First drug resistant TB (DRTB) case was first treated in Port Moresby General Hospital in 1995, followed by the Angau Memorial General Hospital in 2003, and 2009 in Daru General Hospital.

WHO-recommended DOTS Strategy was introduced into the Country in 1997, and was gradually rolled-out to the rest of the country. Daru General Hospital started the DOTS Program in 2002.

The first extensive drug resistant TB (XDRTB) was diagnosed and managed in 2012, in Daru General Hospital, which was the first of its kind in Papua New Guinea.
Strategies and Targets:
The TB Program continues to implement the five components of the World Health Organisation (WHO) DOTS Strategy which further includes Programmatic Management of Drug Resistant TB (PMDT) with HIV-TB Collaboration, to reach its Goals of more than 80% cure rate, more than 90% success rate, more than 75% case detection rate, and 100% DOTS implementation in each Health Facility. The National Department of Health through its National Health Plan (2015-2020), also captures that in Key Result Area (KRA) 6: Infectious Diseases.

In order to achieve the set targets, there had to be continued support in Capacity Building in human resources, infrastructure development, diagnostic facility up-grading, which is now happening through AusAID support.

Progress of Tuberculosis Work in Daru, Western Province:

‘Centre of Excellence in TB Control Program’ is the goal we want to realise, and there are already signs of improvement in the TB Control Program, in Daru General Hospital and the rest of Western Province.

Western Province shares two International Borders in Papua New Guinea – Indonesia’s West Irian (in the West), and Australia’s Torres Strait (in the South). It has three (3) provincial borders. The province has a large land mass (99,300 square kilometres), with more than half covered by water (swamp, lakes and rivers) and is logistically very, very challenging to reach each and every hamlet and community. This has made it difficult or even impossible at times to get to the nearest Health Facility. Health Care Workers to reach either by sea/ water transport (dug-out canoes) or walking, and if you are lucky, a dinghy, truck or even plane can be used. The population is little over 200,000 with a population density of about 2 persons per square kilometre with a third of the total population in each district (South, Middle and North Fly Districts), which can be accessed by Air and Sea Transports only.

The province is naturally rich with mineral resources (gold, copper and iron), petroleum (gas and oil), timber and marine resources (barramundi, lobster and the rest). However, one may ask, ‘are we truly rich?’, and have this natural riches been translated into tangible basic services. There is still an immense gap between the Community Aid Post and the Urban Health Facility (Hospital). This gap has to be reduced, if the people had to receive any health services, through an holistic approach. This can be possible through Partnership at all levels by all concerned stakeholders, with strong political commitment and leadership, locally.

Through the support of AusAID in strengthening the Health Services in Daru and the rest of Western Province, much has been done to build the capacity of Daru General Hospital, and the villages along the coast for health service accessibility.

Diagnosis of TB cases and TB Case management (both drug resistant and sensitive TB cases) has improved immensely, with early diagnosis and early treatment initiation. The real challenge lies in ensuring these patients (drug resistant as well sensitive TB) are properly supervised in their respective communities either through their Community Health Facilities or by Community TB Treatment Providers identified by the members of the Community and trained by TB Program Team based at Daru General Hospital.
**Human Resource Capacity Building:**

We have the following officers in the TB Program:

1. **Provincial TB Coordinator:**
   Over-looks TB Program in the Province through the District TB Coordinators.

2. **District TB Program Coordinators:**
   District Coordinators in each District (South, Middle and North Fly Districts) Coordinate TB Program in collaboration with all Stakeholders, Health Agencies and programs such as HIV AIDS.

3. **Provincial ACSM Coordinator,**
   Overlooks the ACSM program in the province through District ACSM Coordinators, with the expert support of ACSM Specialist.

4. **District ACSM Coordinators:**
   Advocacy Communications Social Mobilisation (ACSM) Coordinators are based in each District and also ensure necessary awareness, community engagement and advocacy is undertaken at all levels in each District.
   All three officers are supported by the Provincial ACSM Coordinator, who is then supported by a Specialist ACSM.

5. **TB Medical Team:**
   Daru General Hospital, for the first time, has a trained TB Physician, managing TB and Medical Cases. He is further assisted by the TB Medical Officer, who was recently recruited because of the demand.

6. **Nursing Staff (Nursing Officer and Trained Community Health Workers)**
7. **Trained TB Microscopists and Technicians for running Gene Xpert machines.**
8. **Trained Community-based Health Care Workers (Aid Posts, Health Centres and Health Sub-Centres)** who are multi-skilled.

**Diagnostic Capacity:**

1. **Gene Xpert:**
   This was first of its kind in Daru General Hospital, and one of the first in the Country, through AusAID support. Enables early diagnosis and early treatment for both DRTB and Sensitive TB (but does not replace sputum microscopy). Gene Xpert is done on Retreatment Cases (Failures, Defaults, and Relapses) and all smear positive (AFB positive)TB patients.

2. **Microscopes** – not just at Daru General Hospital, but also throughout the identified Health Facilities (BMUs) in the Communities, with appropriate staffing and training.

3. **Digital X-ray machine** – first of its kind in the Country, based at Daru General Hospital, supported by AusAID.

4. **Ultrasound scan machine** – has helped us a lot to do scan and appropriate diagnosis and treatment. This was through AusAID support.
5. Other Laboratory Support: Biochemistry and Haematological analysis has helped us a lot in management of TB patients as well as patients with other conditions, again through AusAID support.


**Direct Observed Treatment (DOT): Community TB Treatment Supporters.**
More than 40 Treatment Supporters have been trained in Daru for Daru Island (Corners) and the South Fly Coast Villages (Communities), whose role is to provide supervised treatment (DOT), community awareness and identify symptomatic suspect TB patients, through the support of Provincial Health Office, World Vision and AusAID.

**Unified Coordinated TB Program:**
We also ensure all TB work, as well as recording and reporting is adequately coordinated, not just for South Fly only, but for the whole province.
Our first combined meeting and reporting was undertaken the first quarter. Example: New Smear Positive (NSP) Pulmonary TB (PTB) cases was 51 (SFD 47%, MFD 23%, NFD 29%). It appears South Fly District has more TB cases compared to Middle and North Fly Districts put together.

**Infrastructure Development & Transport Support:**
AusAID has helped build a Modern TB Ward (taking into account infection control) at Daru General Hospital. This is a major step forward in TB Program as well as the General Health Service provision.

A 400hp boat (*Medics Queen*) to help in Rural Outreach Programs, patient retrievals, drug deliveries, and also pick up sputum specimens.

**TB Trends:**
The number of reported TB cases has increased in South Fly District as seen in new smear positive PTB cases: 50 (n=196), 65 (n=296), 66 (n=317) and 95 (n=450) for the 2009, 2010, 2011 and 2012 respectively.
The cure rate was 62%, 57%, 54% and 68.4% for the years 2009, 2010, 2011 and 2012 (for first quarter) respectively. The success rate was 63.5%, 92.9%, 63% and 73.6% for the same years respectively. Default rates decreased from 13% (in 2011) to 5.5% (2012 first quarter). However, failure rate increased from 7% (in 2011) to 21% (in 2012 first quarter), in South Fly District only (which was before TB Program was coordinated as a province as a whole).

One main reason for increasing trend of TB is as a result of increased capacity of the health facility (Daru General Hospital) in terms of improved diagnostic capacity, mobilisation and engagement of skilled technical personnel, and increasing community awareness (ACSM), training and engagement.

**Programmatic Management of Drug Resistant TB (PMDT):**
In 2012 alone, 76% (41) were laboratory confirmed MDRTB cases, of all TB cases (presumed, lab-confirmed, rifampicin-resistant) commenced on appropriate second-line drugs (SLDs), with six (6) confirmed XDRTB cases (between 2012 to 2013 first quarter).
There were more females (44%, n=117) commenced on SLDs than male counterparts (56%, n=117), between the years 2009 (first case) to 2013 quarter one. More females than males have been diagnosed and treated throughout all age groups. There have been three (3) patients, less than 5 years of age, that have been diagnosed with MDRTB (presumed), and are currently on treatment (SLDs). The age group between 15 to 44 years, are diagnosed and treated the most.

There were more TB patients commenced on SLDs in 2012 (65) than in any other year between 2009 and 2012, was basically because of capacity building, through a lot of support from important stakeholders especially AusAID with immense investment in the project.

New MDRTB cases were first diagnosed in 2011 (3) and have dramatically increased in 2012 (20) (Primary Transmission of MDRTB). Bulk of 2012 MDRTB cases were relapse cases (28, n=67). The treatment outcome for 2009 is assessed this year (2013). It is noted that all (3) confirmed MDRTB cases in 2009 died, before they could complete treatment. This was because of delayed diagnosis and treatment. In contrast, 89% (58) of cases diagnosed and commenced on treatment in 2012 are still on treatment (either in Daru Hospital or their respective health facilities).

Primary Transmission of MDRTB and its evidence among younger population, is an evidence of active transmission of drug resistant TB in the community.

The commonest drug resistant pattern seen among MDRTB TB patients is resistance to Isoniazid and Rifampicin with (almost always) resistance to Ethionamide and Streptomycin. Drug resistance patterns can be a guide to formulate drug regimen for presumed MDR TB. The resistance patterns in South Fly District may not be reflective of the Provincial or National drug resistance pattern. However, there is a need to reconsider alternative drug ‘cocktail’ choice in Category II treatment regimen formulation, based on the general drug resistance patterns. Individualised treatment regimen is necessary based on DST results.

**Brief Overview on Hand Over Patients (Queensland Health to Daru, Western Province):**

There were total of 92 patients managed by Queensland Health (in the Torres Strait Clinics – Saibai and Boigu), transferred to the care of PNG (Daru Hospital). These TB cases were handed over between October 2011 and June 2012. One-third (33) of the total cases were drug resistant TB patients, while the rest were sensitive TB cases or those on first-line anti-TB drugs.

About 30% (30) of handover transferred patients had completed treatment (prior to hand-over) under the Queensland Health care, and the rest were still on treatment (or under TB investigation) at the time of transfer. Currently, there are only five (5) MDRTB patients on treatment; with the last patient expected to complete treatment in May 2014.

**Conclusion:**

Without the current support from AusAID, having a functional TB Program in South Fly District (Western Province) could have been far from a wishful dream. Local realisation of the need to improve infrastructure, socio-economic status of the community as a whole, improved political leadership and commitment to improve General Health Services at all levels (down to the Community Aid Post) through strong partnership is a way forward. This will have positive impact on the TB Program in the province. The excellent support
from development partners such as AusAID should be maintained, until local ownership and commitment is realised fully, in the future.

It appears there is a *Dawn of a New Era* not just in TB program, but the whole.

**Acknowledgement:**
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The National TB Program, Disease Control Unit, National Health Department that owns the TB Program, and the Provincial Health Office (Western Province) that ensures program is implemented. Daru General Hospital where the program is housed. AusAID that is supporting the infrastructure development and capacity building. World Vision as implementing agency. Health and HIV Implementation Service Provider (HHISP) (JTAI), that is further supporting the work. Queensland Mycobacterium Reference Laboratory for culture/ DST services. Central Public Health Laboratory (CPHL) that continues to provide external quality assurance on laboratory (including sputum microscopy). Queensland Health Team for clinical collaboration efforts. Maru Marines Group of Companies for helping with the transport of sputum samples from Daru to Horn Island to Cairns (for QMRL) on the Barramundi/ Lobster charters. The School of Medicine and Health Sciences, University of Papua New Guinea, for allowing registrars (rotation) at Daru Hospital. Tabubil Hospital for logistics support for sputum sample transport from Daru to Tabubil to Cairns.

Dr. Bana-Koiri, Port Moresby General Hospital for expert support on clinical case management and advocacy.

Key Personnel in TB Program:

- **Provincial TB Task Force Team:**
  - Alice Honjepari, Director Rural Health Services (Provincial Health Office)
  - Abel Marome, Provincial TB Coordinator
  - Sr. Joseph, Chief Executive Officer, Daru General Hospital
  - Lucy Moris, Deputy Director Rural Health Services
  - Phil Dowton, Health Advisor, HHISP

- **South Fly:**
  - Dr. John Kamakom, TB Medical Officer
  - Fred Awai, South Fly District TB Coordinator
  - Sila Wainette , South Fly District ACSM Coordinator
  - Stella Madiowi, Provincial ACSM Coordinator

- **North Fly TB Coordinating Team:**
  - Ok Tedi Health Services:
    - John Kepolon, Disease Control Officer, Tabubil Hospital
    - Dr. Laki Murray, Physician, Tabubil Hospital
  - Dr. Sharon Brandon, Rumginae Hospital (Evangelical Church of PNG)
  - Kiunga General Hospital:
    - Dr. Julius Plinduo, Emergency Physician
Lewis Mora, North Fly TB Coordinator

Middle Fly TB Team:

Robert Roberts, Middle Fly TB Coordinator

Sinba, MFD ACSM Coordinator

All Community TB Treatment Providers

All Health Care Workers: At Facility Level

Reference:

5. Moke R, Bana-Koiri J, Multidrug-resistant tuberculosis in Port Moresby General Hospital. 2010