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Mr Peter Baxter
Director General
Australian Agency for International Development
GPO Box 887
Canberra ACT 2601
Australia

Dear Mr Baxter,

RE: Risk Analysis of Tuberculosis, Western Province

Please find attached the Executive Summary of the Risk Analysis of Tuberculosis in the Western Province. On behalf of the Government of Papua New Guinea please accept my gratitude for AusAID's support to undertake this important work to fulfil Papua New Guinea's obligations under the International Health Rgulations.

As the summary highlights, the support that has been given by Australia has significantly contributed to the success of programmatic TB management in Daru and the South Fly although there is significant work that remains to be done in the rest of the Western Province. I also note that Professor McBryde concludes that offering TB services to PNG patients in the Torres Strait does not offer a solution to the problem of TB in Western Province and indeed will inevitably lead to increased drug resistance.

I will be tabling the full report of the Risk Analysis at the Health Issues Committee meeting in Cairns at the end of October and will also ensure a copy is forwarded to you.

Yours Sincerely,

Mr Pascoe Kase,
Secretary of Health

Risk Analysis Tuberculosis in Western Province Papua New Guinea

EMMA MCBRYDE: From 9th September – 22 September I was in PNG to assess the burden of tuberculosis and other diseases in Western Province for the Government of Papua New Guinea. Funding for this analysis was provided by AusAID through the HHISP. **These are my findings.**

Tuberculosis in Western Province: tuberculosis is the major infectious diseases burden in the Western Province and indeed all of PNG. On my mission, I found that TB was the principal diagnosis in almost all admitted medical patients. Malaria and HIV are other infectious diseases concerns in the Province but incur a much lower burden currently than TB. This burden is in reference to deaths, morbidity, hospitalizations and utilization of healthcare and cost of treatment. After reviewing 5 TB registers throughout Western Province; 2 in North Fly, 2 in Middle Fly and 1 in South Fly (Daru Hospital) I estimate that registered incidence of all TB in the province is around 500 per 100,000 cases, much higher than the national reported rate of 300, the Western Province estimate reported by PNG National Department of Health of 150 per 100,000. As a comparison, this is almost double the overall incidence in the WHO defined African region (AFR) and similar to Mozambique or Cambodia. The true incidence of TB is likely to be higher, however. Evidence for this is circumstantial but includes; the known difficulty of access to healthcare and poor rural health services in the region, the unusual case mix in many parts of the region (large number of extra-pulmonary to pulmonary cases, large number of women compared with men, late presentation of TB) suggesting a burden of disease that does not reach TB registers. Greater outreach into rural areas will provide more robust estimates of TB incidence.

Multi-Drug Resistant MDR TB: This is by definition TB that is resistant to the 2 most effective drugs used in first line treatment; isoniazid and rifampicin. MDR is much harder to treat, taking usually 20-24 months and requiring much more intensive and expensive therapy. Once MDR TB has emerged, it can be spread from person to person in the same way as drug sensitive (normal) TB is spread. The rates of MDR TB in Western Province are just now being evaluated, with a genXpert machine in use in Daru Hospital since 18th May 2012. Early results are not encouraging, with around 50% of sputum tested positive for TB being MDR TB. 33 cases of MDR TB have been detected (May-Sept 2012) nearly half were in the first 2 weeks, so some time is required to estimate the true proportion of MDR. Port Moresby Hospital is also measuring MDR rates using genXpert, finding around 25% of isolates are resistant in the National Capital District. Only Daru Hospital has programmatic management of MDR TB in place, while the remainder of the province as far North as Kiunga does not test for MDR TB, nor has it available drugs or infrastructure to manage MDR TB. 92 TB patients have been handed over from TSI clinics to Daru, of which 33 are MDR TB.

Extensively drug resistant TB: by definition is MDR TB that is also resistant to two of the second line agents used to treat MDR TB (namely injectable aminoglycoside* and fluoroquinolone*). This level of resistant TB is extremely hard to treat and very expensive. Similar to MDR, XDR TB arises as a result of antimicrobial pressure; the use of (inadequate/interrupted) therapy for MDR TB.

Four known cases of XDR TB have arisen in Western Province, at least 2 of which have direct epidemiological links to the TSI clinics, a third case was a hospital acquired case, a nurse who was treating a Saibai-linked cases.

Trends over time: Incidence, Deaths and treatment failures. Rates of tuberculosis appear to be increasing in some parts of the province, according to the TB registers, particularly in Middle Fly and Kiunga Hospital region. Assuming a catchment of 30,000, TB rates in Kiunga have increased from 600 to 1500 per 100,000 over the last 5 years according to the TB register. Rates of failure and default vary dramatically from year to year with marked increases at Kiunga Hospital in recent years of failures, deaths and defaults. Some of

the defaults can be attributed to shortage of drug supplies and poor community infrastructure for TB support. Daru had an approximately 10% death rate 2008-2010 and a 5% death rate in 2011.

HIV and TB Rates of HIV in TB cases are estimated based on data from only 3 Hospitals; Daru, Rumginae and Tabubil, as these are the only centres presently routinely testing TB patients for HIV. Rates vary from 5% in Daru to 10% in Tabubil. Background estimates of HIV rates are difficult to estimate, but from Kiunga urban clinic performing voluntary testing on pregnant women, 10 of 400 (2.5%) was the current estimate. These rates are concerning, but are relatively low, and essentially rule out the possibility that the current increase in MDR TB and TB incidence in general is driven by high rates of HIV. However, they are significant enough to cause concern that if left unabated, the rates of HIV may rise rapidly and become an additional burden on the healthcare system, manifest in increasing incidence of TB in the next 5 years.

Risk to Australia

Risk of PNG residents with active TB in the treaty region: PNG residents currently may travel into the treaty territory for traditional activities but are currently restricted from accessing health services. Risk to Australians on Saibai and Boigu islands of acquiring TB from PNG residents (around 2500 people movements per month) remains low as long as contact is confined to trading, fishing and other outdoor activity. Risk increases if activity involves residing with Saibai and Boigu residents or sharing schoolrooms, homes or hospital wards without appropriate isolation and ventilation. Education for early detection of tuberculosis, HIV detection and management, 100% neonatal BCG vaccination, cough etiquette training and attention to housing and hospital facilities' ventilation is strongly advised in the treaty regions of the TSI. Evaluation of TSI region and review of TB cases and isolates (including genotype) from Australian residents in the treaty zone would add substantial evidence on which to estimate risk of cross-border and onward transmission of tuberculosis.

Risk of PNG residents outside the treaty region travelling with active TB: Measures are in place to prevent short-term visitors from PNG travelling to Australia, while having infectious TB, including a requirement for medical exam and chest Xray prior to visa. These provide some protection to Australia but do not prevent those with latent TB travelling. The risk from travellers is principally from PNG residents without active pulmonary TB, reactivating after arrival and from Australians acquiring TB in its latent form while living in PNG, reactivating after return. Australia receives 4500 short-term visits from PNG residents per month and approximately 7000 Australian resident leave for short-term visits to PNG each month

Context of PNG risk with risks from other countries: Australia records around 1200 cases of active TB per year, most (80-90%) of which is from overseas arrivals, reactivating latent TB acquired in their country of origin. A minority (~3%) of these cases come from PNG, but the numbers are rising steadily (27 in 2005 to 36 in 2009, 30 of which came from the TSI border region). In 2008-9, 11 of 21 cases of MDR notified in Australia were from PNG, all from treaty villagers seek healthcare in Australia.

Influence of the Saibai & Boigu Australian clinics: The concern of the doctors at the Torres Strait island clinics for their patients and reciprocal respect of the patients for their doctors is very understandable. It also played a key role in alerting Australia to the problems facing the Western Province with MDR TB. However, it does not offer a solution to the problem of TB in Western Province. In the Western Province setting, a world-class healthcare system such as Australia's that can provide second-line agents for MDR TB but not offer programmatic TB control including follow-up and community support, will inevitably lead to increased drug resistance. At least two cases of XDR TB are linked to the TSI clinics and may have been exposed to therapy for MDR TB. Saibai and Boigu clinics have no system for observed therapy or follow-up of patients if they default or

don't take their pills correctly and they do not use fixed dose combination therapy. Hence these clinics have little ability to improve TB in Western Province but a great capacity to make it much worse. Their reported outcomes; (GilpinMJA2008) 8 of 15 dead 4 of 15 completed treatment, is a poor result even for MDR TB, reflecting the difficulties with follow-up and late presentations in the region.

Conclusions

1. Burden of tuberculosis, in particular MDR TB, is very high in Western Province, well above current WHO and PNG Department of Health estimates.

2. Current activities in programmatic management of TB are likely to improve data reliability & availability; including improved communication, transport and outreach, increased basic management units and training.

3. Closing Saibai and Boigu TB services is likely to a) reduce the risk of MDR TB transmission to Australian residents, by reducing the number of PNG Nationals seeking healthcare in Australia and b) reduce risk of XDR TB to PNG residents, by reducing access to second line agents outside a control program.

4. Well-coordinated programmatic tuberculosis management and general healthcare provisions for people of the Western Province must be urgently expanded to avoid increase in MDR and XDR TB.
A decision needs to be made whether to a) remove loose pills and reduce TB treatment, leading to high death rates but lower rates of MDR TB b) stick with past measures for TB and see a rise in death rates and MDR rates in Western province c) roll out programmatic TB management but not MDR TB management, and risk increasing MDR rates or d) expand drug resistant TB programmatic management and risk XDR TB
If option d is taken (my recommendation) many more resources will be needed to support this.

Positive developments in 2012

1. Improved communications-TB control room established, computers, Blackberry telecommunications for Mr. Abel Marome to coordinate TB efforts
2. Improved transport: Medic Queen for outreach to coastal villages, transport of patients/slides/specimens into Daru
3. Programmatic TB rolling out, appointment of Provincial TB coordinator, Mr Abel Marome and Physician, Dr Rendi Moke for Daru Hospital, this has led to improved staff and patient morale
4. Drug delivery; direct medication delivery from secure Quality assured supplies in Port Moresby
5. Programmatic Co-management of HIV/TB commenced in Daru and active in Rumginae and Tabubil
6. Infrastructure; radiography and genXpert machine with increasing staff morale and patient acceptance

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Challenges and recommendations to improve data for risk evaluation

1. Improve recording and reporting.
2. Increase the number of Basic Management Units: this requires training of staff to deliver programmatic TB and provision of a microscope with a trained microscopist. Area in which this is particularly needed is the Middle Fly, Awaba healthcentre, Fly River, and Moreland and around the mouth of the Fly.
3. Outreach: patients continue to present very late, outreach needs to take place on Daru Island and into the villages along the South Coast, up the Fly River and into the North Fly rural centres from which TB patients present including logging centres, additional transport will be required
4. Communication: AusAID has provided Blackberry phones to Mr. Abel Marome and others to communicate without additional cost in order to improve patient management and monitoring. Nevertheless, internet is very slow and useful mostly for email only in Daru. It is slightly better in Middle and North Fly districts. Installation of ViaSat to the TB control room would be a useful communications improvement.

5. Other diseases: it is crucial to continue to expand the HIV testing and co-management currently in place in some hospitals. These need to expand to Middle Fly and to Kiunga urgently. Regarding other disease burdens, malaria is the major other infectious disease, and anaemia, diarrheal disease and trauma also consume health resources, but these are either episodic (diarrheal disease) declining (malaria) or of less significance in terms of lives lost and disability compared with tuberculosis.

General Challenges

1. Hospitals continue to use loose pills, with some adult patients still taking loose pills (rather than fixed dose combination, FDC), and nowhere in the province are paediatric doses of FDC available.
2. MDR TB management is only programmatically managed in Daru Hospital and drug resistance testing is only available in Daru (and through private company in Tabubil). Resistance testing is not routinely available in the Middle Fly District or in Kiunga Hospital and Rumginae, responsible most of North Fly District.
3. Access to healthcare remains extremely limited for many living in the province, as distances are great, roads are few, travel is relatively expensive, and rural Aid-Posts and Health Centres are poorly staffed and in dilapidated states.
4. Running out of TB medication was routine (a few times every year) until recently. Commitment by AusAID and WHO programmatic management as well as great efforts by TB coordinator for the province (Mr. Abel Marome) has improved this situation

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General Recommendations

1. Retention of staff, particularly rural staff. Rural Health staff absenteeism is very high, estimated to be around 50%. Mission Hospitals, however, seem to retain staff. All public healthcare facilities that I saw were in need of repair and few were well ventilated. The health centre at Mabaduan ought to be a priority in this regard. It currently remains without electricity or reliable water and only radio communication. This could be addressed, followed by other rural health facilities throughout the province.
2. Rapid rollout of programmatic management of TB, including using only FDC where possible & co-management of HIV, with rapid diagnostic tests. This was taking place at Daru and Rumginae Hospitals (and I understand also at Tabubil) but not at the other 2 hospitals or the rural health centre that I visited.
3. Rapid roll-out of management of drug-resistant TB will be needed to reduce emergence of MDR TB but cannot occur until infrastructure is in place to ensure directly observed therapy and continuation to completion of MDR drug course
4. Immediate improvements in infection control in particular use of personal protective equipment; N95 masks should be worn by all staff in the general medical, TB and radiology wards. Patients with a cough should be asked to wear masks and undiagnosed patients with a cough should not be co-housed with either TB patients or other patients until sputum microscopy is performed. Ventilation should be optimized.

List of Abbreviations

FDC fixed dose combination

MDR TB Multi-drug resistant tuberculosis

TB tuberculosis

TSI Torres Strait Islands

XDR TB extensively drug resistant tuberculosis