Te Niwha

Research Project Impact Case Study

Mahi Tahi:
Decreasing transmission and improving diagnosis of Tuberculosis to reduce health inequities

Key researchers
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Introduction

In Aotearoa, TB affects people of Māori and Pasifika ethnicities (6 and 16 cases per 100,000) disproportionally, when compared to NZ Europeans (1 case per 100,000). This includes Aotearoa-born Pasifika and Pasifika born outside Aotearoa (25% of total overseas-born TB cases in Aotearoa are from the Pacific). Together with the University of Otago researchers and the Communicable Diseases Research Centre (CDRC) at Fiji National University and Fiji National TB Reference Laboratory, this study aims to strengthen tuberculosis (TB) drug resistance detection and genomic surveillance capacity in Fiji and the wider Pacific by piloting whole genome sequencing (WGS) and developing targeted sequencing methods for *Mycobacterium tuberculosis*. The project has made substantial progress in scientific outputs, laboratory capability, and national partnerships.

Key achievements

A key achievement has been the successful sequencing and analysis of additional *M. tuberculosis* isolates using the Oxford Nanopore MinION and Illumina platform. These genomic datasets have generated high resolution insights into circulating TB lineages, drug resistance mutations and potential transmission clusters. Advanced bioinformatics pipelines were applied to produce robust lineage typing, resistance prediction and phylogenetic reconstructions, demonstrating science excellence and establishing Fiji as a leader in emerging TB genomics within the Pacific region.

The project has also advanced targeted sequencing assay development. Using saliva as a model substrate, the study identified minimum detectable DNA levels and optimised extraction and library preparation steps. This innovative work moves towards a rapid, low-input sequencing approach that has strong potential for future sputum-based TB diagnostics in low resource settings.

Collaboration has been fundamental to progress. The Fiji National University (FNU) AMR and Genomics Laboratory provided the primary platform for laboratory work, staff engagement and technology transfer. The University of Otago contributed expertise in microbial genomics, bioinformatics and methodological development, supporting training, analysis, troubleshooting and scientific oversight. The Fiji Ministry of Health and Medical Services (MoHMS), through the National TB Programme, played a critical partnership role by guiding surveillance priorities, reviewing genomic outputs, co-developing reporting templates and aligning activities with national TB control objectives. This tri-institutional collaboration has ensured that the project remains relevant, implementable, and directly connected to national public health needs.

Capacity building has been a major outcome. Laboratory scientists and early career researchers at FNU received extensive hands-on training in DNA extraction, MinION sequencing, targeted sequencing, QC analysis and genomic interpretation. These activities have strengthened local technical expertise and contribute to long term workforce sustainability across Fiji's TB diagnostic and surveillance system.

The project also developed practical tools including metadata forms, genomic reporting templates, cluster maps and a draft TB genomic surveillance framework. These tools were created in collaboration with MoHMS and will support future integration of WGS into national TB surveillance once digital systems and operational processes are ready.

Impact

This project demonstrates how a truly transdisciplinary research response with strong links to clinical care can provide high-quality research that can be used to change clinical practice and develop skills and capacity at both local and regional levels. Fiji National TB Reference Laboratory is responsible for diagnosing TB cases in Fiji as well as from the neighbouring Pacific countries. Therefore, building Fiji National TB laboratory genomics capacity through this project enables better TB surveillance and diagnosis in the Pacific Region. This study will contribute to building technical capacity and the empowerment and development of the next generation of Pasifika researchers and leaders through two Pacific Masters students by applying a With-Pacific-for-Pacific-by-Pacific approach. This research offers a unique opportunity for us to help build sustainable capacity within the wider Pacific region while linking these skills and research to disease impacts in NZ.