

This article is an early release of information from Inform'ACTION No. 32, which will be published very soon.

## Laboratory-based influenza surveillance project: Achievements and opportunities

### Background

The laboratory-based influenza surveillance project was initiated by SPC and the Pasteur Institute of New Caledonia in late 2005 under the framework of the Pacific Public Health Surveillance Network (PPHSN). The project is funded by the Centers for Disease Control and Prevention (CDC) and has been implemented across a large geographical area, including countries and territories in both the North and South Pacific.

PPHSN partners that also contribute to the initial planning and implementation of the project include the World Health Organization Collaborating Centre for Reference and Research on Influenza (WHO-CC) in Melbourne, Australia, the Pacific Paramedical Training Centre (PPTC), and the Institute for Environmental Science and Research in New Zealand (see previous articles in *Inform'ACTION* issues 24, 26 and 29).

The project is now in its fifth and final year of operation under the current funding arrangement. It aims to strengthen Pacific Island laboratories in their ability to test for influenza, pack and send samples to reference laboratories, and contribute to influenza surveillance. This is achieved through the provision of equipment, including an immunofluorescent microscope, reagents, logistics, and technical assistance by a laboratory specialist and an epidemiologist. Assisting Pacific Island countries and territories (PICTs) in preparing for outbreaks of influenza, and working closely with SPC's Pacific Regional Influenza Pandemic Preparedness Project is an important aspect of the project.



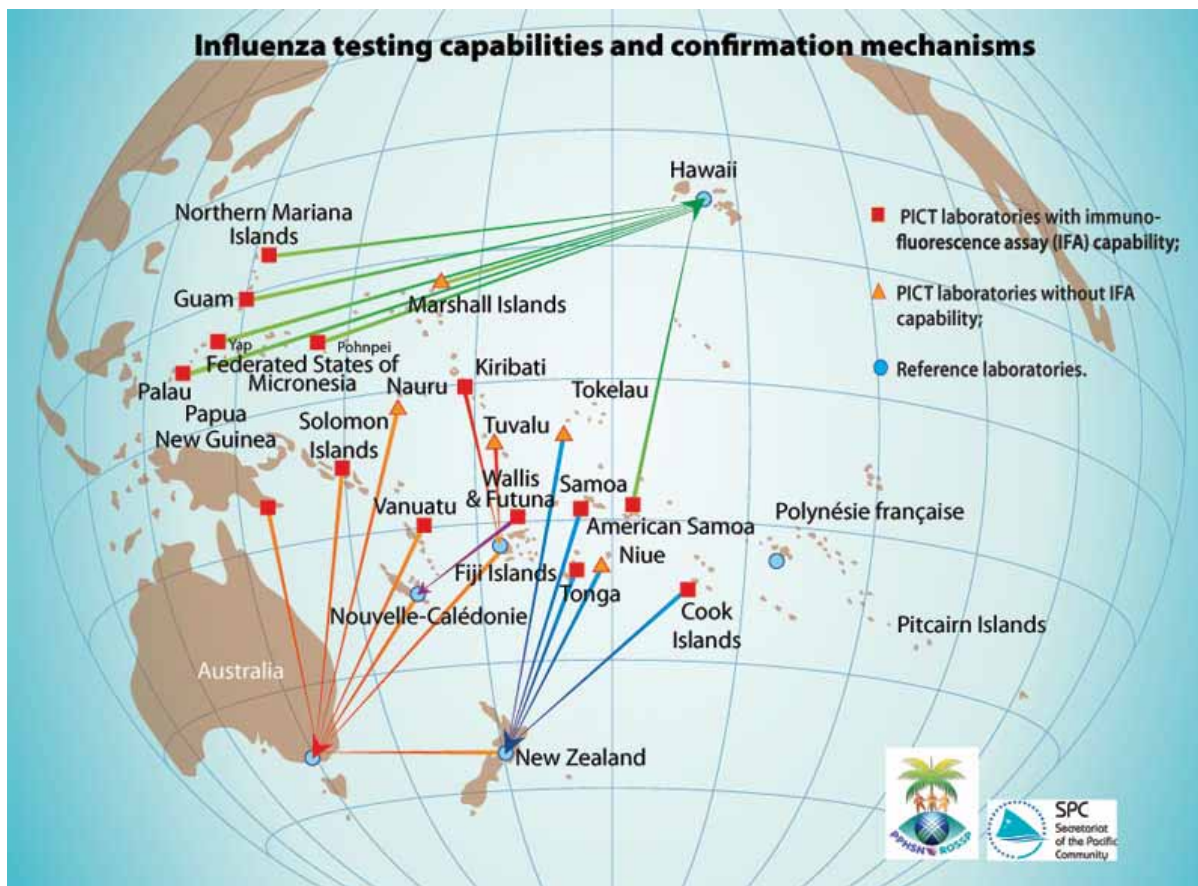
In addition to those mentioned, the project works in close collaboration with partners acknowledged below.

### Project progress

Between September 2005 and August 2006, the project established influenza testing by immunofluorescence assay (IFA) and enhanced influenza surveillance in six PICTs: Cook Islands, Fiji, Guam, Palau, Tonga, and Wallis and Futuna. Surveillance was already established in New Caledonia and French Polynesia. In the second year, the project was implemented in an additional four PICTs: Federated States of Micronesia (in Pohnpei), Samoa, Solomon Islands, and Papua New Guinea (Boroko).

In the third year, the project provided follow-up activities for implemented countries and training. Three new sites were proposed and implemented: American Samoa, FSM (Yap) and Kiribati. In the fourth year (September 2008 to August 2009), two additional PICTs — Vanuatu and the Commonwealth of Northern Mariana Islands (Saipan) — were added, thereby increasing the number of sites with immunofluorescence microscopy capability to 15 in 14 PICTs. Follow-up visits aim to consolidate the project in these sites, in order to identify and solve problems and confirm that sample

transport arrangements and on-site IFA training and sample packing are undertaken during visits.



Strengthening PICT relationships with reference laboratories and streamlining sample transport arrangements are important for the sustainability of influenza surveillance. To assist with this, a series of subregional workshops was organised for PICT human and animal laboratory staff to update their skills and knowledge on laboratory surveillance of influenza. A workshop was held in Guam in October 2009 involving 9 laboratory staff from the US-affiliated Pacific Islands. The National Centre for Biosecurity and Infectious Disease at Upper Hutt, New Zealand was the venue for another workshop for 8 participants from Polynesian countries, and included 2 animal health staff. For the Mataika House workshop held in Suva, Fiji in June 2010 there was an increased focus on collaboration between human and animal health laboratory staff with 16 participants (10 human health and 6 animal health staff). In addition, 23 human and animal health staff received training in Dangerous Goods packaging and shipping.





By the end of June 2010, 33 laboratory technicians had received in-country IFA training, 20 had received enhanced training at reference laboratories and 54 had received certification or recertification on packaging and sending infectious substances. Providing opportunities for PICT laboratory staff to visit and work with the reference laboratories that they send samples to facilitates strong working relationships and allows PICT staff to see first hand the technical and quality procedures undertaken in higher level laboratories, especially those involving PCR methods.

In support of the project, WHO-CC Melbourne has put in place an External Quality Assurance programme. This involves sending a panel of IFA slides to be tested by PICT laboratories. The slides may be positive for influenza A or B strains as well as respiratory syncytial virus. PICT laboratories undertake the IFA on the panel of slides and send the results to WHO-CC for assessment. Response to the initial external quality assurance (EQA) process by PICT laboratories was poor and there will be an increased emphasis on EQA in the project. WHO-CC Melbourne is further supporting laboratories undertaking IFA by providing additional positive and negative control slides.

The involvement of an Influenza Surveillance Specialist in the project since February 2009 has allowed an increased emphasis on linking laboratory-based surveillance of influenza with surveillance of influenza-like illnesses in PICTs.

## Impact of pandemic H1N1 on influenza testing and surveillance

During 2009, the pandemic of influenza A (H1N1) heightened awareness of influenza testing and surveillance in PICTs as well as the need for effective and streamlined sample referral mechanisms and well established arrangements with reference laboratories. WHO-CC Melbourne, the main reference laboratory for the project, received 1,989 samples from PICTs during 2009, a marked increase over previous years and the largest sample number from a region other than Australia. Of these, almost 44% were positive for influenza virus with 29% positive for pandemic H1N1 (pers. comm., Dr Patrick Reading, WHO-CC). The pandemic highlighted the importance of ongoing influenza-like illness surveillance combined with regular laboratory-based influenza surveillance in being able to detect and monitor influenza outbreaks.

## Recent laboratory developments



The WHO-supported implementation of influenza testing by PCR at Mataika House in Suva, Fiji, as one of the Level-2 laboratories identified in the Pacific Islands region, has further strengthened the influenza testing capacity in the South Pacific. Mataika House provides confirmatory testing for Kiribati and Tuvalu as well as sites in Fiji.





SPC supports efforts to develop enhanced public health laboratory services at the Guam Department of Public Health and Social Services. Establishing a Level 2 Public Health Laboratory facility in Guam would substantially strengthen the laboratory network in the Pacific.

### Project challenges

The project has faced a range of challenges that can be summarised into three main categories:

- 1) The limited laboratory and surveillance infrastructure in PICTs presents difficulties for implementing and supporting a disease-specific project such as the laboratory-based influenza surveillance project. Sample collection has been irregular and the coordination of the surveillance process has been less than ideal.
- 2) Technical aspects of the project have been challenging, including the relative complexity of the IFA methodology and the need for well trained and experienced technicians in reading slides. This has been compounded by turnover in laboratory staff. The correct collection of nasopharyngeal samples is also a key issue.
- 3) The organisation of sample packaging and transport mechanisms from PICTs to reference laboratories.



Mrs Ane Ika, Principal Medical Scientist, Laboratory Service, Tonga, shared her country experience with us:

'There have been some challenges since the beginning of the influenza surveillance but at the same time, we have learned a lot.

After an initial slow response to sending specimens to the lab... It took the influenza H1N1 pandemic to catapult things into full blast.

When we sent specimens to New Zealand we found we had some false negatives. When we reevaluated those slides we found that some could have been positive but for the rest — they could not have been read as positive on those slides. A learning experience.

We also found out just recently that the lamp of the IF microscope was "expired" and could have explained what we had originally thought as its being "out-of-focus".

Some of the challenges included running out of reagents/slides during the pandemic, the need for more of the special swabs (not the usual cotton-tipped swabs).

We have not done any slides lately (including our EQA) since we are still awaiting a replacement lamp for the IF microscope.

Three people are trained to do the screening of the IF slides. This includes Filimone Fili who attended the training in Wellington earlier this year. We plan to train others later on.'

### Project opportunities\*

With the completion of the implementation in 15 sites in the Pacific, the project will have an increased focus on consolidation and problem solving as well as monitoring and evaluation of the laboratory-based influenza surveillance in the Pacific.

SPC aims to contribute to collaborative laboratory strengthening initiatives in PICTs. Laboratory assessments in collaboration with CDC, the Association of Public Health Laboratories (APHL) and WHO, specifically those addressing influenza testing capabilities, has begun with Mataika House. The expansion of this assessment to other PICT laboratories that are willing to undergo this

exercise is proposed. An international laboratory assessment tool provided by CDC and APHL is used for L2 labs and those L1 labs with molecular diagnosis for influenza.

The project will seek to support influenza surveillance activities in countries not involved in the IFA implementation through technical advice on surveillance and laboratory methods and support for sample shipping. The project has also increased its collaborative efforts with animal health laboratories.

Because of difficulties with storage and transportation of specimens in viral transport medium there has been limited culturing of influenza virus from PICT specimens submitted to reference labs. Virus isolates are important for antigenic characterisation, vaccine strain selection and antiviral resistance testing. Sending samples in viral transport medium will be encouraged in some PICTs and this has been supported by CDC funding for the purchase of -80°C freezers for nine PICTs involved in the project.

SPC has applied to CDC (under the Cooperative Agreement Grants) for further funding to support influenza surveillance in PICTs.

### **Importance of collaboration**

The laboratory-based influenza surveillance project relies on a broad range of collaborating partners whose assistance and support is gratefully acknowledged.



The Pacific Island Health Officers Association (PIHOA) provides a major sample transport coordinating role in the North Pacific by consolidating sample shipments from US-affiliated Pacific Islands in Guam before arranging for packaging and sending samples to the reference laboratory. In addition, the Regional Laboratory Coordinator of the Pacific Island Health Officers Association, Mrs Vasiti Uluiviti, provides training and certification on the transport of dangerous goods (infectious substances) under the International Air Transport Association regulations and has been of great support to the project in training workshops. Under International Air Transport Association (IATA) regulations, recertification is required every two years. Further training for PICT laboratory technicians is proposed for the LabNet meeting later in 2010.

WHO and SPC continue to work in partnership to support the development of laboratory and surveillance systems in PICTs. In recent times, WHO has supported the project in delivering training during subregional workshops.

Reference laboratories associated with the project provide an excellent influenza testing service as well as support with training, technical expertise and resources. Apart from the central role played by the WHO-CC (Melbourne), the National Centre for Biosecurity and Infectious Disease provides confirmatory testing for laboratories in Polynesian countries; Pasteur Institute of New Caledonia and Wallis and Futuna; Mataika House for Fiji and, more recently, Kiribati and Tuvalu; and the Hawaii State Laboratory for the US-affiliated Pacific Islands. WHO-CC (Melbourne) also supports the EQA programme by providing IFA test slides for PICT laboratories.

Maintenance of IFA microscopes has proved a challenge in the project. An 18-month initiative beginning in 2009 and funded by the Australian Agency for International Development under the Pacific Technical Assistance Mechanism, has placed three biomedical engineers (BMEs) in the Pacific to build capacity, provide training and improve the maintenance and management of biomedical equipment. The BME for Vanuatu and Solomon Islands is based at Port Vila Hospital in Vanuatu, the BME for Tonga, Samoa and Cook Islands is based at Vailoa Hospital in Nuku'lofa,

Tonga and the BME for Nauru, Kiribati and Tuvalu is based in Nauru. BMEs have proved valuable in servicing and repairing a number of the immunofluorescent microscopes.

Finally, the project and the Pacific Regional Influenza Pandemic Preparedness Project have worked on the joint goal of improving the readiness of PICTs to deal with outbreaks or a pandemic of influenza or avian influenza. Applying the lessons from these projects can assist PICTs in preparing for any infectious disease emergency.

### **Acknowledgements**

SPC gratefully acknowledges the contributions by partners and the financial and technical support provided by CDC for the laboratory-based influenza surveillance project. The support provided by PICT ministries of health and, particularly, laboratory managers and staff has been appreciated. SPC looks forward to continued collaboration to ensure that PICTs will always be the priority.

The contribution of previous project staff is also acknowledged.

**\*Note:** Further information about these challenges and opportunities can be found in the SPC paper, 'Moving ahead with influenza surveillance in Pacific Island countries and territories' in this bulletin.

#### **Ms Salanieta Elbourne Duituturaga**

Laboratory Specialist, SPC  
Email: [Salae@spc.int](mailto:Salae@spc.int)

#### **Mr Anthony Kolbe**

Influenza Surveillance Specialist, SPC

#### **Dr Justus Benzler**

Communicable Disease Surveillance Specialist, SPC