

PACE-NET Key Stakeholder Conference

*Strengthening Pacific-European
Collaboration in Research,
Development and Innovation*

Brussels, 20-23 March 2012



Policy Brief • **Working Draft**
July 2012

Climate Change and Health in the Pacific

#7

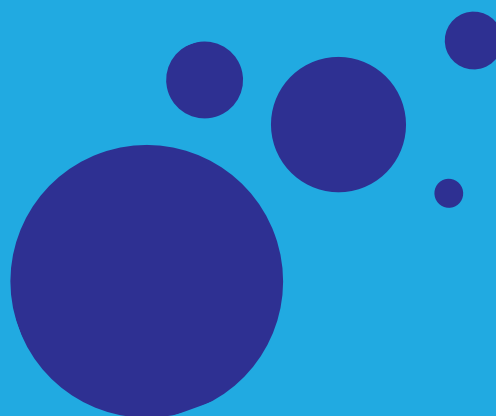


SPC
Secretariat
of the Pacific
Community



Key Messages

- The populations and economies of Pacific nations are too small to undertake the research necessary to inform their own evidence based health programs. Effective health planning in the Pacific can only be undertaken when long-term, collaborative, research has provided the necessary evidence.
- Current (rheumatic heart disease, leptospirosis, dengue, food and water-borne diseases, HIV AIDS) and emerging (influenza, vector-borne viruses, antibiotic resistant bacteria) communicable diseases pose a threat to the health and productivity of the people of the Pacific which they are ill equipped to manage.
- Almost all communicable disease threats in the Pacific are likely to be exacerbated by climate change and the effects are likely to vary from one island nation to the next so a single approach to this issue is unlikely to be appropriate for all locations.
- The extensive air links within the Pacific and between the Pacific and major Asian, American and European population centres allows the rapid movement and mixing of almost any pathogen able to infect humans.
- There is a need to **establish, train and sustain** a laboratory diagnostic capacity throughout the Pacific in order to provide comprehensive data which can be used to measure disease trends and to evaluate the effectiveness of any interventions.





Abstract

Traditional life styles and diets in Pacific nations are being replaced by western equivalents with a devastating effect on health. Food, water and mosquito-borne diseases have been identified as a, largely unquantified, threat to the health of people in this region as have other infections associated with poverty (e.g. respiratory and diarrhoeal diseases and rheumatic heart disease). Several studies point to climate change exacerbating these problems. The shortage of human and financial resources in these countries has resulted in health systems that are unable to provide comprehensive diagnoses of many of the diseases that affect the people of this region. Without this data it is difficult to plan or evaluate interventions or to design meaningful research programs.



Background

The populations and economies of most Pacific nations are too small to be financially viable and so they are heavily dependent on international aid for their existence. Australia provides half (AUD\$1.16 billion in 2011-2012) of the total Official Development Assistance (ODA) to Papua New Guinea and the Pacific Island countries. The remainder is derived, principally, from Japan, New Zealand, the U.S. and the E.U. E.U. research funding flows principally to, or through, the French territories of French Polynesia and New Caledonia. Australia's aid agency, AusAID, has traditionally placed a strong emphasis on maternal and child welfare in their health programs and has been reluctant to support what are seen as scientific research projects. There is concern about the role of donors in setting priorities for the expenditure of aid funds and the short term of some funding which reflects a political, rather than development, imperative.

While all Pacific nations have health plans, plans to meet millenium health goals and plans to manage climate change, almost none have the resources, financial or human, to implement these plans. The proposal, by W.H.O. that all developing countries should implement a basic public health package in order to resist climate change and that this should include "comprehensive risk assessment, environment and health surveillance, preventive and curative interventions, disaster preparedness, and building institutional research capacity targeting the upcoming threats" is unrealistic for most

Pacific Island nations because they have almost no institutional research capacity – the exceptions being Papua New Guinea and the French Territories. These problems are compounded by political instability (disruption to national administration; reluctance of donors to fund) and the lack of base-line data against which to measure the effectiveness of these plans if the resources were available to implement them.

There already is enormous global interest and research efforts addressing HIV, malaria and TB, but many of the current and emerging communicable disease threats in the Pacific are not receiving similar attention or resources. Similarly, the issue of obesity and the associated diabetes and cardiovascular risks among Pacific islanders already have been identified and so these are more of an operational than a research topic.

| Country | Population |
|------------------|------------|
| Papua New Guinea | 6,858,000 |
| Fiji | 861,000 |
| Solomon Islands | 572,000 |
| French Polynesia | 271,000 |
| New Caledonia | 254,000 |
| Vanuatu | 240,000 |
| Western Samoa | 180,000 |
| Tonga | 104,000 |
| Cook Islands | 20,000 |

Research, Development and Innovation Areas Needing Action in the Pacific

A meeting of the Pacific Europe NETWORK for Science and Technology (PACENET) in Brisbane in 2011 highlighted a number of diseases which posed a threat to health in the Pacific and which warranted a significant local research effort. However, the magnitude of these threats remains largely unquantified because of the lack of comprehensive laboratory diagnostic facilities.

Water

1. Environmental contaminants (pollutants: heavy metals, fertilizers, herbicides and insecticides;

contaminants of natural origin: marine biotoxins, mercury)

2. Leptospirosis
3. Water-borne diarrhoeal diseases.

Vector-borne diseases

1. Novel technologies for disease surveillance
2. Effect of climate and environmental change on disease patterns
3. Ability of local mosquitoes to transmit exotic viruses which are seen as a health threat
4. Novel approaches to mosquito control

Neglected and future disease threats

1. Zoonotic diseases
2. Arthropod [mosquito]-borne viruses (Arboviruses)
3. Anti-microbial drug resistance
4. Rheumatic fever

Non-communicable diseases

1. Health in transitional communities
2. Monitoring and analysis of health trends
3. Evaluation of health interventions
4. Impact of climate change on non-communicable diseases



Sanitation remains a challenge to the health of Pacific Island residents

There is a high incidence of rheumatic heart disease in some Pacific Island communities as a result of repeated Streptococcal infections.



Experts' Recommendations for Priority Topics

Research into all of the topics above would have a significant impact on the health of those living in the Pacific and may help mitigate the effects of climate change. Priority for funding should be given to those where the research will contribute to local capacity building, (including training, infrastructure, equipment, joint research collaboration and education) to estimates of the burden of the disease being studied, to identification of environmental and societal drivers, to the development of policy to support possible interventions, to the methodology for evaluating any interventions and that the research will ensure community engagement and/or community adhesion to these programmes. In addition, there is a critical need to **employ, train and sustain** people who can provide the routine diagnostic support to inform the care of patients and the development of evidence based public health interventions.

Of the topics identified at the Brisbane PACENET meeting, several could be the subject of immediate research in a number of Pacific Island nations.

These included Streptococcal disease (e.g. rheumatic heart disease), vector-borne viruses (e.g. dengue, Chikungunya, Ross River virus) and their mosquito vectors, water-borne diseases (e.g. Leptospirosis) and food-borne agents like *Salmonella*, *Shigella*, *Listeria* and *Compylobacter*.

1. The incidence of rheumatic heart disease in the Pacific (374 cases/100,000 residents) is the highest in the world and is almost forty times higher than in established market economies (Carapetis et al., 2005). Reducing this burden is an obvious research target.
2. Mosquito-borne diseases. All dengue outbreaks in the Pacific are due to dengue viruses introduced to the region with viraemic travellers (Cao-Lormeau et al., 2011; Li et al., 2010). Because of the lack of laboratory diagnostic facilities, there are no accurate figures for how many cases occur in any outbreak. However, a recent unpublished study, found 96 per cent of a sample of 800 residents of Western Samoa

had serological evidence of past infection with dengue viruses. In 1979-80, tens of thousands of cases of epidemic polyarthritis occurred in New Caledonia, Fiji, Tonga, Samoa and the Cook Islands due to the introduction of Ross River virus from Australia (Aaskov et al., 1981). Transmission of Ross River virus almost certainly is occurring in Fiji today, undetected by local health authorities (Klapsing et al., 2005) and travellers return regularly to Europe with Ross River virus infections (e.g. Cramer et al., 2011). After an enormous outbreak of Chikungunya around the Indian sub-continent, beginning in 2005, hundreds of travellers presented with Chikungunya infections throughout Europe and the virus established cycles of local transmission in Italy. More recently, the virus appears to have become established in New Caledonia.

3. Leptospirosis is a zoonotic disease with cycles of transmission involving humans and both native and domestic animals. It is known to occur in Papua New Guinea, New Caledonia, Vanuatu, Fiji, Palau, Micronesia, Guam and French Polynesia (Berlioz-Arthaud et al., 2007). However, most studies have focussed on outbreak investigations rather than comprehensive analyses of the epidemiology of the disease which might aid control.
4. Food-borne diseases are another unquantified health issue that are the subject of occasional outbreak investigation but, rarely, are the subject of the sort of systematic surveillance that might allow timely intervention or the development of control measures (Hughes and Lawrence, 2005).



Beginning in 2000, dengue viruses from the Philippines (pink), Malaysia (green) and Myanmar/Thailand (red) spread throughout the Pacific.



Obesity and the associated diabetes and cardiovascular disease are well recognised, but unresolved, health issues in the Pacific

Investment Strategies

1. Fund an upgrade of staff competencies and laboratory facilities at the central diagnostic laboratory in each Pacific island country and provide the resources to enable each to provide accurate and timely diagnoses of diseases which pose a threat to the health of their people.
2. Fund a two year program of passive surveillance, by these laboratories, of communicable diseases in the largest hospital in the capital city of each Pacific Island country supported by

active surveillance for communicable diseases among children (n = 2000) which result in absences from school of two days or more.

3. Fund research into the four priority issues identified above – Rheumatic heart disease, mosquito-borne viral diseases, Leptospirosis and food borne diseases.
4. Fund research in priority areas identified as a result of the active and passive surveillance programs in (2).



Outcomes

1. A cadre of local laboratory staff able to participate in a systematic study of diseases in their communities into the future.
2. Epidemiological pointers to the sources and patterns of transmission of communicable diseases in these countries which will guide control strategies.
3. Research data which provides pointers to the most effective prevention or control measures for diseases posing a threat to the health of Pacific Islanders i.e. a reduction in morbidity and mortality.
4. Sufficient data to identify priorities for future research and baseline data against which to measure the effectiveness of public health interventions.



Implementation

Year 1. Identify one Pacific Island nation state in which to begin work.

- Identify the local capacity that is needed and how to provide it.
- Develop a detailed operational plan and prepare the necessary standard operating procedures.
- Obtain necessary approvals.
- Train, build, equip.

Year 2 Commence operations

- Identify an additional country(s) in which to begin operations
- At year end, review lessons learned in country 1 and modify operations accordingly.

Years 3-7 Continue to roll out the program and initiate the research required to address health priorities.



Funding Options

1. A detailed, two year, communicable disease study in just one country.
2. A detailed communicable disease study in just one country with funds to undertake research into diseases that are thought to be an issue at that locality i.e. identified at the Brisbane PACENET meeting.
3. Rolling, two year, communicable disease studies commencing in new countries at intervals of a year without any commitment for subsequent funds to undertake essential research.
4. Funds to undertake research into diseases which were identified at the 2011 PACENET meeting in Brisbane as having, or likely to have a significant impact on the health of Pacific populations (e.g. water and food-borne diseases, vector borne disease, Streptococcal disease) but without any commitment to strengthening of local diagnostic capacity.
5. Rolling, two year, communicable disease studies commencing in new countries at intervals of a year with funds to address communicable disease priorities identified by these studies and funds to commence research into priority diseases identified at the Brisbane PACENET meeting.

Risks

1. European partners will not be prepared to provide temporary staff for Pacific laboratories during the 3-5 years required to train additional laboratory staff. *This might be addressed if Australian and New Zealand citizens/institutions were included in the program.*
2. Newly trained staff will not return to their home country. *This can be addressed by the country providing the training cancelling the trainees visa at the conclusion of training.*
3. The comprehensive laboratory services will not be sustainable once external support ceases. *This is expected. An outcome would be the prioritisation of laboratory testing based on the results of this program.*
4. Social and political instability.

Funding Partners

Funding for this research should be long term (5-7 years with review milestones at 3 and 5 years) in order to accommodate the time scale for training of local participants and in order to be able to measure trends in changes in patterns of disease. Long term commitment also would distinguish this program from those where the desired outcome is simply some short term political benefit to the donor. Partners from outside the Pacific should be prepared to have staff on the ground in the Pacific for 50-75 per cent of duration of the project. Actors from outside the Pacific should only be considered as research partners if they have a track record of working in resource poor settings.

Unless a strong case can be made for alternatives, all research should involve multiple Pacific nations. Co-funding models might be considered where Pacific partners fund a portion of the research costs from their own resources – perhaps with long term loans from the Asia Development Bank or similar international funding agencies.

Pacific partners might approach AusAID to fund the training of laboratory staff in support of this project as this is an area AusAID has supported in the past.

References

- Aaskov et al. (1981). An epidemic of Ross River virus infection in Fiji, 1979. *American Journal of Tropical Medicine and Hygiene* 30: 1053-1059.
- Arnold et al. (2007). Threats to human health and environmental sustainability in the Pacific Basin. *Environmental Health Perspectives* 115:1770-1775.
- Arnold et al. (2011). The status of water and sanitation among Pacific Rim nations. *Reviews on Environmental Health* 26:17-30.
- Australian Government (2010). Pandemics and emerging infectious diseases framework 2010-2015. http://www.ausaid.gov.au/publications/pubout.cfm?ID=7048_5390_3050_7859_8550.
- Australian Government (2011). The critical decade: Climate change and health. http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf.

Berlioz-Arthaud et al. (2007). Multicentre survey of incidence and public health impact of leptospirosis in the Western Pacific. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 101:714-21.

Cao-Lormeau et al. (2011). Recent emergence of dengue virus serotype 4 in French Polynesia results from multiple introductions from other South Pacific islands. *PLoS One* 6:e29555.

Carpenter, 2011. Health effects of persistent organic pollutants: the challenge for the Pacific Basin and for the world. *Reviews on Environmental Health* 26:61-9.

Carpentis et al. (2005). A global burden of group A streptococcal diseases. *Lancet Infectious Diseases* 5:685-694.

Chinain et al. (2010). Ciguatera Risk Management in French Polynesia: the case study of Raivavae Island (Australes Archipelago). *Toxicon* 56: 674-690.

Cramer et al. (2011). Polyarthritis in two travellers returning from Australia. *Journal of Clinical Virology* 52: 1-3.

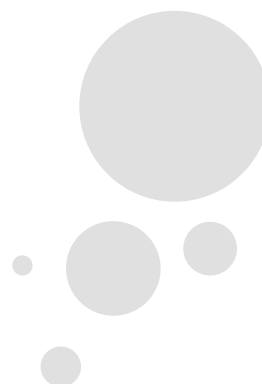
Daudens et al. (2009). Epidemiology of leptospirosis in French Polynesia from 2006 to 2008. *Bulletin Épidémiologique Hebdomadaire* N°48-49-50].

Hughes and Lawrence (2005). Globalization, food and health in Pacific Island countries. *Asia Pacific Journal of Clinical Nutrition* 14:298-306].

Li et al. (2010). Rapid displacement of dengue virus type 1 by type 4, Pacific region 2007-2009. *Emerging Infectious Diseases* 16: 123-125.

McMichael et al. (2002). Human health and climate change in Oceania: a risk assessment.
[http://www.health.gov.au/internet/main/publishing.nsf/Content/2D4037B384BC05F6CA256F1900042840/\\$File/env_climate.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/2D4037B384BC05F6CA256F1900042840/$File/env_climate.pdf).

Mills et al. (2010). Potential influence of climate change on vector-borne and zoonotic diseases: a review and proposed research plan. *Environmental Health Perspectives* 118: 1507-1514.





Author

John Askov
Morgan Mangeas

Queensland University of Technology, Australia
IRD Espace, Noumea, New Caledonia

Acknowledgements

The authors thank John Attard Kingswell, Melanie Bannister-Tyrrell, Hervé Bossin, Eric D'Ortenzio, Allison Imrie, Vaira-Irisa Kalnina, Van-Mai Lormeau, Graham Mackereth, Lohi Matainaho and Manju Rani for their contributions to the discussions during the first PACE-NET workshop in Brisbane to finalise the draft policy brief.

Imprint

The INCO-Net project PACE-NET, an EU Seventh Framework Programme (FP7)-funded initiative, was set up with the main goal of strengthening bi-regional Science and Technology cooperation between Europe and the Pacific (grant agreement 244514). The project specifically aims to provide a dialogue platform for enabling key stakeholders to present ideas and initiatives to the European Commission (EC), EU member states as well as international funding representatives on how this cooperation can be further strengthened.

For further information, please contact the project coordinator Prof. Dr. Claude Payri (claud.payri@ird.fr) or the coordinator of the bi-regional dialogue Dr. Gerd Rücker (gerd.ruecker@dlr.de).
www.pacenet.eu

