

Lift-off fellowship report: Mathematical modelling of infectious diseases

Roslyn Hickson¹

For my Lift-Off Fellowship, I attended an internationally recognised course on ‘Mathematical Modelling of Infectious Diseases’ at the University of Utrecht, in The Netherlands, from 5 to 16 July 2010. The course was divided into two parts: ‘basics of’ and ‘advanced’ modelling of infectious diseases, covering a wide breadth. An important aspect of the course was the opportunity to meet and work with researchers in infectious disease modelling, including leading researchers such as Professors Diekmann and Heesterbeek, and to form connections with other new researchers from around the world.

On return from the course in Utrecht, I worked on modelling dengue fever, focussing on far north Queensland where it is an increasing problem. Dengue ‘overwintered’ in 2010, which suggests it is now endemic. I explored the effect of seasonality on dengue in Queensland, and presented my preliminary results at the 2010 AustMS conference in Brisbane. In particular, I performed a sensitivity analysis of my model, which showed the lifespan of the mosquito to be significantly less important than the magnitude of the ‘seasonality’ of the mosquito population.

I am currently working on modelling the dynamics of tuberculosis (TB) transmission from regions of high to low prevalence. This is of particular importance when considering multidrug-resistant (MDR) strains. The work is motivated by tuberculosis in the Papua New Guinea (PNG)–Torres Strait Island region, where 25% of all MDR-TB cases occur in Australia. I presented some initial results at the 2011 ANZIAM conference in Glenelg, where I showed that increasing treatment in PNG will significantly reduce prevalence in the Torres Strait.

My attendance at the Utrecht course has significantly fast-tracked my learning in a field that is quite different to my PhD and undergraduate background, and has hence ‘jump-started’ my post-PhD career. It has provided the opportunity to bring international knowledge and new insights to my department, which will prove crucial as my colleagues and I intend to develop a similar course based at the National Centre for Epidemiology and Population Health at the ANU.



Roslyn graduated with a Bachelor of electrical engineering from UNSW@ADFA in 2006. She was awarded a PhD in applied mathematical modelling from UNSW@ADFA in 2010. Her PhD addressed heat and mass transfer through multilayered materials. Roslyn is currently working at the National Centre for Epidemiology and Population Health (NCEPH) at the Australian National University, where her focus is on the control of infectious diseases.

¹National Centre for Epidemiology and Population Health (NCEPH), Australian National University, Canberra, ACT 0200. Email: roslyn.hickson@anu.edu.au