



**SACEMA**  
DST/NRF Centre of Excellence in Epidemiological Modelling and Analysis

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## SACEMA NEWSLETTER



### **No 20: December 2011**

*The director, staff and students of SACEMA would like to wish our friends, colleagues and collaborators a Blessed Holiday Season and a Prosperous New Year! We will be closing the wine cellar briefly from 19 December until 2 January 2012.*



### **NEWS:**

#### **Potential impact of expanded access to treatment for HIV prevention**

In the first days of November, SACEMA had the privilege of hosting a high level workshop of the international 'HIV modelling consortium', funded by the Bill and Melinda Gates Foundation, focusing on models of early treatment and their potential impact. Participants included the head of the AIDS programme at the World Bank, as well as senior investigators from the relevant major studies around the world, and representatives of the Global AIDS programme in the US government, the National Institutes of Health, and leading modelling groups around the world. Model scenarios were intriguing, debate was intense and constructive, and the prognosis was sobering. Consensus seemed to be that treatment alone, at conceivable levels, given the current financial and infrastructural outlook, can substantially curtail HIV incidence, but does not appear to open a road to HIV eradication. So we must accept that we must look to the 'multiple prevention methods' paradigm, new technologies, and cleverer healthcare systems if there is to be a future where HIV is a tolerable burden on those societies currently bearing the greatest impact. It also suggests an on-going role for activism to improve the aforementioned 'financial and infrastructural outlook'.

## GRADUATIONS:



Benn Sartorius obtained a PhD from Wits University. His dissertation titled “Spatial-temporal modelling of all-cause and cause-specific mortality in rural South Africa” was supervised by Prof Kathleen Khan.

Stanley Mulaudzi obtained an MSc from the University of Venda under the supervision of Prof Winston Garira. His thesis is titled “Mathematical Modelling of Transmission and Control of Malaria in South Africa”.



Josephine Ochigbo obtained an MSc from the University of Stellenbosch. Her thesis titled “Investigating the simultaneous effect of age and temperature on the population dynamics of female tsetse flies” was supervised by Prof John Hargrove and co-supervised by Dr Rachid Ouifki.

Dieter Winkler obtained an MSc from the University of Stellenbosch under the supervision of Dr Farai Nyabadza. Dieter’s thesis is titled “Modelling the effect of HIV on age-specific incidence of active TB disease: a comparison between Taiwan and Cape Town Metropole”.



We wish our graduates all the best with their future careers!

## NEW FACES AT SACEMA:

SACEMA welcomed the following new researchers to the Wine Cellar:



Gordon Botha has a background in Mathematical Statistics and Bioinformatics. He recently completed his MSc in Computer Science at the University of Stellenbosch, with specialisation in Evolutionary Modelling. By associating with SACEMA he hopes to learn how to ask the right questions, and also how to answer them. In his spare time he likes to go birding in remote destinations and hopes to still be alive when we reach Singularity. :)



Dr Martin Nieuwoudt completed his PhD in Bioengineering at the University of Pretoria in Gauteng South Africa. He has a multi-disciplinary research background. His interests are in modelling a diverse range of biological and medical systems. He is a new arrival at SACEMA and is particularly optimistic about the range of possibilities for modelling various aspects of HIV.

## RESIGNATIONS:



In December we said goodbye to Dr Hayden Eastwood who spent 2 years at SACEMA as a postdoctoral research fellow working on improving HIV incidence estimation with the BED technique and generating models that explore HIV infection dynamics in a variety of settings. We wish Hayden all the best for the future.

## CAPACITY BUILDING & TRAINING EVENTS:

### Population Dynamics Seminar: 8 to 11 November 2011

Prof Jacek Banasiak visited SACEMA in November to give a series of talks on population dynamics, over four days. He also made himself available for informal discussion with individuals during that period, and a number of students and staff took advantage of the opportunity. Prof Banasiak is Head of School of Mathematical Sciences at UKZN, and Editor-in-chief of *Afrika Matematika*. His lectures built upon those he gave at Sacema last year, constituting an introduction to structured population models. This time he dealt with long term behaviour of discrete linear models before moving on to continuous models, nonlinear models, and specifically the age structured epidemiological model of McKendrick type. As usual, he included rigorous treatment of the mathematics together with applications to biology and epidemiology.

### Durban Research Day: 23 November 2011

Thanks to funding sourced by Dr Travis Porco of University of California at San Francisco, a Durban SACEMA Research Day was mounted on 23 November, in conjunction with SACEMA associates, alumni and students at UKZN. The event took place in the School of Physics, and was convened and chaired by Dr Alan Matthews. There were talks by Prof John Hargrove, Dr Henry Mwambi and Dr Alan Matthews on current work in modelling, and six current or graduated SACEMA students, Jordache Ramjith, Tarylee Reddy, Tanya Maistry, Ronel Sewpaul, Mbuso Mntambo and Bibi Adam, presented their work to date, and interacted vigorously with a critical-but-friendly audience. John Hargrove and Gavin Hitchcock travelled from SACEMA for the event, and the presence of Profs Delia North and Glenda Matthews and some local supervisors was greatly appreciated. The formal proceedings ended with a useful discussion, engaging with topics such as access to data, biostatistics capacity-building and ongoing collaborations between SACEMA and UKZN. A convivial subset of the approximately twenty participants continued the conversation afterwards at Cafe 1999.

Some personal responses from participants:

"It was such a success [...] and I hope that this is the start of many more such events."

"It was my pleasure being there. It was such a great, spirited and motivating day [which] has really sparked up my motivation and I'm so ready to get through with my work. ... Thanks for making such great efforts to keep us motivated. It really means a lot to us all in Durban."

"[It] was worth every minute [...] seeing our students so confidently presenting and participating in discussions."

## SACEMA Seminars

The following seminars were presented from October to December:

- \* Dr Leigh Johnson of the Centre for Infectious Disease Epidemiology and Research (CIDER), School of Public Health & Family Medicine, University of Cape Town "*The role of sexually transmitted infections in the transmission and control of HIV in South Africa*".
- \* Dieter Winkler "*Modelling the effect of HIV on age-specific incidence of active TB disease: a comparison between Taiwan and Cape Town Metropole*".
- \* Guy Mahiane "*Maximum likelihood estimation of the 'BED window period' and of the HIV incidence rate*".
- \* Juliet Nakakawa "*Modelling malaria and sickle cell gene*".
- \* Bewketu Bekele "*Modelling the impact of shifting the current ART initiation threshold on the HIV epidemic*".
- \* Damian Kajunguri "*Tsetse dynamics and Trypanosomiasis*".
- \* Prof Jean Nachega, Director, Dept. of Medicine and Centre for Infectious Diseases (CID), Faculty of Health Sciences, Univ of Stellenbosch "*Novel Treatment Adherence Strategies to Prevent Disease Progression and Sexual Transmission, and Reduce Healthcare Costs*".
- \* Cynthia Mazinu "*Estimation of HIV treatment coverage*".
- \* Joseph Ssebuliba (PhD defence) "*In-vivo mathematical modelling for the coinfection dynamics of HIV-1 and HHV-8*".
- \* Hayden Eastwood "*Does Injected Hormonal Contraception Significantly Increase the Incidence of HIV in the General Population?*"

## RECENT PUBLICATIONS:

Artzrouni M, Begg C, Chabiniok R, Clairambault J, Foss A, **Hargrove J**, Lee EK, Siggers JH, Tindall M. (2011) The First International Workshop on the Role and Impact of Mathematics in Medicine: A collective account. *American Journal of Translational Research*, 3: 492-497.

Auvert B, **Mahiane SG**, Lissouba P and Maureau T. (2011) Statistical power and estimation of incidence rate ratios provided by HIV incidence testing for evaluating HIV intervention programs among young people. *Plos One*, 6(8): e21149.

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**Delva W**, Richter M, De Koker P, Chersich M, Temmerman M. (2011) Sex Work during the 2010 FIFA World Cup: Results from a Three-Wave Cross-sectional Survey. *Plos One*, 6(12):e28363.

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Jones L, Akugizibwe P, Clayton M, Amon JJ, Sabin M, Bennett R, Stegling C, Baggaley R, Kahn JG, Holmes CB, Garg N, Makhoulf-Obermeyer C, Defilippo Mack C, Williams P, Smyth C, Vitoria M, Crowley S, **Williams B**, McClure C, Granich R and Hirnschall G. (2011) Costing Human Rights and Community Support Interventions as a Part of Universal Access to HIV Treatment and Care in a Southern African Setting. *Current HIV Research*, 9(6): 416-428

Kahn JG, Marseille EA, Bennett R, **Williams BG**, Granich R. (2011) Cost-Effectiveness of Antiretroviral Therapy for Prevention. *Current HIV Research*, 9: 405-15.

Okosun KO, **Ouifki R** and Marcus N. (2011) Optimal control analysis of a malaria disease transmission model that includes treatment and vaccination with waning immunity. *BioSystems*, 106: 136–145.

Tiemersma EW, van der Werf MJ, Borgdorff MW, **Williams BG** and Nagelkerke NJ. (2011) Natural history of tuberculosis: duration and fatality of untreated pulmonary tuberculosis in HIV negative patients: a systematic review. *PLoS ONE* 6, e17601.

Venkatesh KK, Du Bruyn G, Lurie MN, Modisenyane T, Triche EW, Gray GE, **Welte A** and Martinson NA. (2011) Sexual risk behaviours among HIV-infected South African men and women with their partners in a Primary Care Program: Implications for couples-based prevention. *AIDS and Behavior*, DOI 10.1007/s10461-011-9941-y

Wallengren K and **Williams BG**. (2011) The incidence and distribution of Multidrug- and Extensively Drug-Resistant Tuberculosis in KwaZulu-Natal, South Africa, 2001-2007. *Epidemiology and Infection* 17.

**Williams B**, Lima V, Gouws E. (2011) Modelling the Impact of Antiretroviral Therapy on the Epidemic of HIV. *Current HIV Research*, 9(6): 367-382

**Williams BG**, Abdool Karim SS, Karim QA, Gouws E. (2011) Epidemiological Impact of Tenofovir Gel on the HIV Epidemic in South Africa. *Journal of Acquired Immune Deficiency Syndrome*, 58(2): 207-10.

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