



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

Director: Alex Welte (alexwelte@sun.ac.za)

Research Manager: Lynnemore Scheepers (scheepersl@sun.ac.za)

Mailing address: Private Bag X1, Matieland 7602, South Africa

Physical address: 19 Jonkershoek Road, Stellenbosch, 7602, South Africa

Phone: +27 (0) 21 808 2589

Fax: +27 (0) 21 808 2586

Inquiries: info@sacema.com

Web site: www.sacema.com

Quarterly Epidemiological update: www.sacemaquarterly.com

SACEMA NEWSLETTER

No 18: April 2011



NEWS:

8.8 million euro for Treatment-centred HIV prevention in Swaziland

During the last decade the fight against AIDS has seen great results. However, for every new person to begin HIV treatment, two more people get infected. Experts predict that the number of people in need of HIV treatment will be so large in 2050 that the current approach will be unaffordable.

It is expected that by 2050, 11 million people will die of AIDS yearly, instead of the 1.8 million people in 2009. SACEMA has formed a partnership with STOP AIDS NOW!, Clinton Health Access Initiative (CHAI) and other stakeholders in the fight against HIV to prove that using HIV treatment as a method of prevention can cause a turnaround in the epidemic.

With 8.8 million Euros, the Dutch Postcode Lottery enabled the consortium to do what no one else has dared to do. Scientific models suggest that earlier initiation of antiretroviral treatment (ART) for HIV-infected people can not only improve the quality and the life expectancy of patients, it can also prevent new infections. When people take ART, the viral load in their blood is reduced and the chance of spreading the virus is about 90% less. However, this method of Treatment-centred HIV prevention is yet to be tested in real life. STOP AIDS NOW! and CHAI therefore start in Swaziland with treatment 2.0.

Together with The Global Network of People Living with HIV, SACEMA at Stellenbosch University, University of Amsterdam, the Ministry of Health of Swaziland and local partners like SafAIDS, STOP AIDS NOW! and CHAI want to introduce this Treatment-centred Prevention, through:

- Mobilizing the entire population to be tested for HIV. At this moment only 16% of the people has been tested;
- Starting ART sooner. To date people only start treatment five to ten years after infection. At the end of 2014 90% of the people in need of treatment should be getting it. It is expected that this will result in a reduction of new infections of 50%.

SACEMA, will be supervising the statistical and mathematical modelling component of the project. Specifically, time trends in the coverage, retention, adherence, viral load and sexual risk behaviour among HIV infected people in Swaziland will be monitored, and mathematical models will be constructed to estimate the impact of the project on the spread of HIV in Swaziland.

Sexual Networks Study

In 2010 SACEMA commenced a new project entitled "**Data-driven modelling of the impact of early, wide-scale HIV treatment in South Africa**". Led by principle investigator, Dr. Wim Delva, the project is a joint initiative of SACEMA at the University of Stellenbosch and Ghent University's ICRH and is funded by the Flemish Interuniversity Council (VLIR) and the Flemish Research Fund (FWO).

Because very little information is known about the importance of sexual network structure for Treatment-centred HIV prevention, the project aims to collect data on aspects of the sexual network in which the wide-scale, early HIV treatment would be implemented. Specifically, we will carry out a cross-sectional behavioural survey that looks at the age differences between sexual partners, the duration of relationships, and the existence and duration of overlapping relationships in order to elucidate key aspects of sexual networks and how they relate to HIV status.

Study Coordinator, Roxanne Beauclair has been finalising preparations for fieldwork set to commence at the beginning of April. A dedicated team of research assistants will be surveying residents – whom were previous Zambia South Africa TB and AIDS Reduction (ZAMSTAR) study participants – in Delft, Khayelitsha Site C, and Wallacedene. The study will employ Audio-Computer Assisted Self-Interviewing (ACASI) methods and provide a private, mobile office in which the participants will take the survey. The study team has high hopes that these unique methods will produce fruitful and truthful results and are eager to get the study underway.

2011 Graduations

We are pleased to announce that the following SACEMA-supported students graduated this year:



Matadi Maba obtained a PhD from the University of KwaZulu-Natal under the supervision of Prof Peter Leach. His thesis was entitled "Singularity and Symmetry Analysis for HIV-TB Co-infection"



Olina Ngwenya obtained an MSc from the University of KwaZulu-Natal under the supervision of Dr Henry Mwambi. Her thesis was entitled “statistical and mathematical modelling of HIV and AIDS, effect of reverse transcriptase inhibitors and causal inference for HIV mortality”.

Tarylee Reddy obtained an MSc from the University of KwaZulu-Natal under the supervision of Dr Henry Mwambi. Her thesis was entitled “Multistate transition models with application to HIV/AIDS progression”.



Tarylee Reddy and Olina Ngwenya both got distinctions for their MSc degrees. We congratulate them on this outstanding achievement.



Asha Kalula obtained an MSc from the University of Stellenbosch under the supervision of Dr Farai Nyabadza. Her thesis was entitled “Modelling the Dynamics of Methamphetamine Abuse in the Western Cape”.

Patrick Phepa obtained an MSc from the University of Stellenbosch under the supervision of Dr Farai Nyabadza. His thesis was entitled “Mathematical Modelling of the Dynamics of HBV and its HIV Co-infection”.



We wish all our graduates all the best for their future endeavours.

New faces at SACEMA

SACEMA welcomed the following new staff members in the beginning of 2011:



Hilmarie Brand, a Masters student in Mathematical Statistics at the University of Stellenbosch, joined SACEMA in January as a researcher in Statistics. She is currently working on HIV incidence estimation.

Roxanne Beauclair joined SACEMA in January as the co-ordinator for the Sexual Networks study. She is interested in finding out if there is a relationship between HIV status and age disparate relationships and sexual partner concurrency. Roxanne is a Social Anthropologist by training and studied at the University of Cape Town (UCT). She is currently working towards a Master in Public Health (MPH) in Epidemiology and Biostatistics at UCT.





Dr Gavin Hitchcock was appointed as Assistant Director: Training, from January 2011. The appointment is on a part-time basis, and when not at SACEMA he writes books; two current mathematical projects are: *Dialogues in the History of Algebra*, and *Approaching Mathematical Analysis With the Help of its History*, while a long-term interest in mathematics competitions, talent-search and schools-enrichment has issued in another project: *A Mathematical Safari*. Dr Hitchcock sees his primary responsibility at SACEMA as engaging constantly with students and their supervisors to monitor and evaluate progress and general well-being. Out of this process, in consultation with the Director, come appropriate strategies for supporting and training students, and nurturing their current work and longer-term careers. This includes alerting and advising students about available materials, training events, course modules, fees, assessment procedures, etc. Dr Hitchcock has been preparing guidelines for students on dissertations and theses incorporating published papers, on collaboration and co-authorship, and on plagiarism, as well as compiling a basic library of texts and pdfs for students starting out on mathematical and statistical epidemiology. Another major responsibility is designing and commissioning courses and lectures. Planning and facilitating the March Research Days meeting, with Lynnemore and Natalie, was one of Dr Hitchcock's first major tasks. He has also been involved in the organisation of the following activities:

Courses and workshops:

- Introduction to Matlab (March-April)
- Introduction to Epidemiology and Research Methodology (weekly, April-June),
- Meaningful Modelling of Epidemiological Data (May/June),
- Applications of Mathematics in Biology and Medicine (July),
- Introduction to Applied Biostatistics (July)
- Advanced Epidemiological Methods (August)
- Population Modelling (October/November)

Introductory talks on biological, medical and epidemiological matters (especially relating to HIV and TB) for mathematical modellers:

- Keren Middelkoop (May)
- Leigh Johnson (June)

VISITORS:



Viviane Lima from the University of British Columbia in Canada spent three weeks at SACEMA from 4 to 21 April. She holds a PhD in Epidemiology/Biostatistics from the University of British Columbia, Canada where she is currently employed as an Assistant Professor in the Division of AIDS of the Faculty of Medicine. Viviane has been involved with HIV/AIDS research since 2006 when she joined the British Columbia Centre for Excellence in HIV/AIDS. She works closely with Drs Montaner, Harrigan and Hogg, and she has several ongoing collaborations with researchers across Canada, US, South Africa and Europe. By combining statistical, mathematical and epidemiological methods, her area of research focus on the investigation of innovative prevention strategies to the transmission of HIV, and innovative intervention strategies to avert HIV/AIDS disease progression.

Eddy Kimba from the University of Kwazulu-Natal visited SACEMA for one week from 30 January to 5 February. He worked with Rachid Ouifki and other SACEMA students and staff on problems with two time scales.

SCIENTIFIC MEETINGS:

CROI

SACEMA sent a delegation of three to the recent Conference on Retroviruses and Opportunistic Infections (CROI), which is a one of the highlights of the year in HIV-related basic science. Key topics attracting attention were:

- An apparently unstoppable trend of initiating treatment ever earlier for HIV positive people, which seems clinically justified and also holds great promise as a pillar of HIV prevention through the reduction of infectiousness for those who are potential spreaders.
- Antiretroviral treatment for high risk HIV negative individuals, as an alternative to traditional vaccines, so that any HIV exposures will happen in a physiological context that is highly unfavourable for viral replication and the establishment of systemic infection.
- The changing landscape of ARV treatment programs as they become mature and a growing number of people can be said to be truly engaged in the challenges of lifelong treatment that were anticipated with the revolution, 15 years ago, brought about by the discovery of highly effective drug-based suppression of HIV.

These and other headline issues at CROI 2011 are all of substantial interest within the ongoing research programs at SACEMA.

Mission to Malawi

From 11 to 15 April 2011 Cari van Schalkwyk joined Dr Cyril Pervilhac from the WHO headquarters in Geneva on a mission to Lilongwe, Malawi. The main purpose of the visit was to establish a data inventory for the country in order to do a triangulation exercise so as to evaluate trends in TB and HIV epidemics and mortality. The mission was successful as the team was able to obtain data to start preliminary analyses, talk to stakeholders about other relevant data sources and learn about the abilities and interests of the local people to do the exercise.

EVENTS:

SACEMA Research Days

On 15-16 March, in Die Bloukamer at the Neelsie in Stellenbosch, a two-day celebration took place of the valuable research and capacity-building being carried out under SACEMA's auspices. Fifteen Masters students and six PhD students presented their work to date and outlined their future plans, while talks were also given by two Postdoctoral students and four researchers. A number of external supervisors took the trouble to attend, for which we are grateful. Some senior visitors commented on the rich variety and the high standard of the work that was presented.

Questions, comments and sometimes vigorous discussion followed each talk. In addition to this valuable verbal feedback, all students have (or will soon have) received written feedback on their presentations, with ideas for sharpening questions or suggestions for possible future directions.

Since informal networking and discussion of common interests is felt to be as important for a student as the formal sessions, the research meeting was designed with ample social time, kicking off with a reception at SACEMA on Monday evening when newcomers were introduced and old friends met again. A conference dinner was held on the second evening in the Java Cafe, and the meeting concluded with a spit-braai in the beautiful setting of Molenvliet Wine Farm, where most of the participants were accommodated.



SACEMA Seminars

The following seminars were presented from January to April:

- Eddy Kimba *“Two time scale problems: The Centre manifold and the Quasi Steady State Approximations”*.
- Funeka Bango *“TB and HIV”*.
- Íde Cremin *“Modelling the population-level impact of Pre-Exposure Prophylaxis for HIV prevention in KwaZulu-Natal, South Africa”*.
- John Hargrove *“BED mean recency duration (and other thoughts)”*.
- Christiaan Marais *“Markov Processes”*.
- Viviane Dias Lima *“SACEMA Visit: Recent clinical and modelling studies from the BC centre for Excellence in HIV/AIDS”*.

UPCOMING EVENTS:

Clinic on the meaningful modelling of epidemiological data: 30 May – 10 June 2011

SACEMA, in collaboration with the African Institute for Mathematical Sciences (AIMS), is again holding a 2 week modelling clinic that will emphasize the use of data in understanding infectious disease dynamics. The Clinic will bring together graduate students, post-doctoral students, and researchers from the United States, Canada, and Africa, with the goal of engaging the participants in epidemiological modelling projects that use real data to grapple with practical questions in a meaningful way. Applications for the clinic are now closed.

Applications of Mathematics in Biology and Medicine: 4 – 8 July 2011

SACEMA, in association with AIMS, invites applications from suitably qualified candidates to attend a course on the Applications of Mathematics in Biology and Medicine, to be conducted at the African Institute for Mathematical Sciences (AIMS) in Muizenberg, Cape Town, between 4 and 8 July 2011.

Its purpose is to introduce South African students on mathematical science courses to the wide range of applications of mathematical and statistical techniques in various areas of biology and medicine.

For more information, visit our website: <http://www.sacema.com>

Introduction to Applied Biostatistics: 11 - 22 July 2011

This is a two-week course for post-graduate students, organised by SACEMA, UKZN and Ghent University, at the African Institute for Mathematical Sciences (AIMS), Muizenberg, Cape Town. For more information and to find out how to apply, visit our website: <http://www.sacema.com>