



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

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## SACEMA NEWSLETTER

*No 26: July 2014*



### NEWS:

#### **SACEMA issues policy brief on access to antiretrovirals**

On the occasion of AIDS 2014, the twentieth International AIDS Conference in Melbourne, SACEMA released a policy brief and press release on the ongoing debate about appropriate initiation of antiretroviral therapy (ART) for HIV positive people.

Noting with approval the bold approach lately espoused by the South African ministry and department of health, SACEMA hopes this policy brief provides further support within public discourse to the department in its efforts to press ahead into uncharted territory with its world leading ART programme.

The key point of this statement is that investigation and debate among scientists and public health professionals should shift from fine tuning criteria for initiating ART, to embracing the next waves of challenges that will result from making ART initiation the domain of informed and supported patient choice, rather than eligibility guidelines.

Attempts to delay the inevitable, in terms of massive programmes and unknown long term challenges and limitations of this most effective of interventions, it is argued, are at best fleeting, and at worst risk delaying preparedness for what ultimately lies ahead in any case.

The full policy brief and press release can be accessed at <http://www.sacema.org/node/sacema-issues-policy-brief-on-access-to-antiretrovirals>

## Trypanosomiasis Research

Research on trypanosomiasis is giving rise to various activities at, and organised by, SACEMA. Sarah Ackley, a PhD student in Epidemiology and Translational Science at University of California San Francisco is currently at SACEMA, working with John Hargrove on improving methods for estimating tsetse mortality from ovarian age distribution data.



Sarah is the first of the US visiting student at SACEMA to be funded by the International Clinic on Disease Dynamics, and Data (ICI3D) Research Scholars Exchange Program. This program provides former MMED and DAIDD participants the opportunity to do a 6-week research exchange abroad.

Trypanosomiasis, a deadly disease for both humans and livestock if left untreated, is spread by tsetse flies and is a major public health concern in many regions of sub-Saharan Africa. It is accordingly of vital interest to understand tsetse population dynamics. Tsetse mortality estimates are central to understanding population dynamics and disease dynamics, yet are very difficult to acquire directly from wild populations.

In principle, it should be possible to determine how mortality rate changes with season and over time by analysing changes in tsetse age-distributions over time. However, previous methods for estimating mortality assume a stable age distribution – an assumption that is not justified and has been shown to bias mortality estimates. Sarah and John developed a dynamical modelling technique to estimate tsetse mortality, incorporating what is biologically known about tsetse population dynamics. Models were fitted to age-distribution data collected at Rekomitjie Research Station in the Zambezi Valley in Zimbabwe during the 1990s.

Meanwhile offers have been made to engage the services of a Cambridge University post-doctoral fellow to work on other aspects of field data collected in Zimbabwe during the 1990s. Eight Masters and PhD students in Zimbabwe, Tanzania and South Africa are also being funded – via a WHO grant being administered through SACEMA. As Principal Investigator on this Project, Professor Hargrove attended a capacity development workshop being run by the WHO in late July.

## 2014 Graduations

Congratulations to the following SACEMA-funded students who graduated in 2014:



Wilbert Sibanda graduated with a PhD in Information Technology from North-West University under the supervision of Prof. Phillip Pretorius. His dissertation was titled: “Statistical modelling of the HIV/AIDS data in South Africa”.



Yusentha Balakrishna graduated with an MSc in Statistics from the University of KwaZulu-Natal. Her thesis titled “Estimating the Force of Infection from Prevalence Data: Infectious Disease Modelling” was supervised by Prof Henry Mwambi.

Humphrey Brydon graduated cum laude with an MSc in Statistics from the University of the Western Cape. His thesis titled “Using a weighted bootstrapped logistic regression modelling procedure to identify risk behaviours associated with sexual activity” was supervised by Prof R nette J Blignaut.



Cynthia Mazinu graduated with an MSc in Mathematics from the University of Stellenbosch. Her thesis titled “Estimating treatment coverage in South African ART clinics based on the time trend of the CD4 count distribution at ART initiation and a dynamical epidemiological model” was supervised by Prof Wim Delva.

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

## New faces at SACEMA

SACEMA welcomed the following new students to the Wine Cellar in 2014.

Eva Liliane Ujeneza is a PhD student working with Dr Martin Nieuwoudt on modelling the dynamics of CD4 T-cell reconstitution of HIV infected patients on HAART.



Sifiso Vilakati is a PhD student working with Prof Alex Welte on Characterisation and modelling of HIV transmission networks.



## Visiting Researchers

Mr Kassahun Workalemahu, a lecturer at Addis Ababa University in Ethiopia, visited SACEMA from February to the end of April 2014. During his visit, Mr Kassahun worked with Dr Rachid Ouifki on the effectiveness and cost-effectiveness of some malaria control interventions that are (or are to be) carried out in Ethiopia with a particular focus on seasonality and malaria strain diversity in Ethiopia.



For this, a mathematical model for the transmission dynamics of the disease is formulated. The model accounts for seasonality and includes two malaria strains and the control measures of interest. The collaboration will be pursued to fit the model to data that is being collected in Ethiopia and a cost-effectiveness study will be performed to determine the most effective/cost-effective combination of control measures.



Dr Joanna Lewis from CoMPLEX at the University College London (<http://www.ucl.ac.uk/complex>) visited SACEMA for one month during February of 2014. Joanna earned a PhD in "Mathematical and Statistical Modelling of CD4 T-cell Reconstitution in HIV-infected Children Starting Antiretroviral Therapy" and consequently has experience of great value to, for example Dr Martin Nieuwoudt, at SACEMA. Martin and Joanna have embarked on a series of collaborative research ventures initially including a study on "Age related differences in the T-cell dynamics of HIV-infected people on long term ART", which employs a very large amount of IeDEA data

for patients of all ages. Joanna and Martin are also co-supervising Eva Ujeneza for the studies that will compose her PhD. Joanna was well-received at SACEMA and she clearly enjoyed her time here. She was fortunately able to join Gavin, Martin, Roux-Cil and Philip on a climb of the Helderberg which all parties survived, albeit only just in the case of Martin. We look forward to a long and fruitful research relationship with Joanna.

## EVENTS:

### SACEMA Research Days Meeting, 19-20 March 2014



SACEMA Staff, Students and Supervisors at the annual Research Days meeting held in Stellenbosch, March 2014

About fifty people took part in SACEMA's held annual 'Research Days' meeting in Stellenbosch, over two full days, 19-20 March, kicking off with refreshments at SACEMA on Tuesday evening 18 March. All SACEMA funded students were invited to give a short talk on their work-in-progress and engage in discussion with SACEMA researchers as well as supervisors from other universities, who were also invited to participate. The event was a great opportunity for students old and new to present their work and receive incisive, constructive criticism in a friendly environment. It was also a time to meet new friends and see how individual projects fit into the bigger picture of SACEMA's work.

The meeting opened with a welcome by SACEMA Director, Alex Welte, followed by the key-note talk by Wim Delva, who reviewed recent developments in HIV epidemiology in Southern Africa, giving highlights of progress and challenges. The thirty student talks (fifteen MSc and fifteen PhD) represented the wide range of work being carried out by SACEMA-funded students throughout South Africa. As usual, high priority was given to informal interaction as well as the formal question-time after each talk. Participants enjoyed a spit-braai on the Wednesday evening, and the conference dinner was held on the second evening at Decameron Restaurant.

## Quantitative Bias Analysis: 21-23 May 2014



Dr Matthew Fox and participants at the Quantitative Bias Analysis course held in Stellenbosch, May 2014

Dr Matthew Fox, of the Department of Epidemiology and the Center for Global Health and Development at Boston University, has visited SACEMA annually since 2010, to give his acclaimed course on advanced methods in epidemiology. In May, Matt presented for the first time a course on using quantitative bias methods with epidemiological data, providing powerful tools which allow investigators to go beyond mere speculation about the bias. Participants received a copy of the book by Lash, Fox and Fink: *Applying Quantitative Bias Analysis to Epidemiologic Data* (Springer 2009). The course drew twenty participants, and received high commendation. It is hoped to continue our association with Matt in future, alternating this course with the Advanced Methods in Epidemiology.

## Clinic on the Meaningful Modelling of Epidemiological Data (MMED): 2-14 June 2014



Faculty and Students at the MMED Clinic held in Muizenberg, June 2014

Once again, our annual two-week modelling clinic, mounted in collaboration with the International Clinics on Infectious Disease Dynamics and Data (ICI3D) Program, and the African Institute for Mathematical Sciences (AIMS), brought together at AIMS over forty graduate students, post-doctoral students and researchers from Africa and North America. The Clinic emphasizes the use of data in understanding infectious disease dynamics and aims to engage participants in interdisciplinary modelling projects that use real data to grapple with practical questions in a meaningful way.

The sister clinic: Dynamical Analysis of Infectious Disease Data (DAIDD) took place last December 16-20, 2013, in Gainesville, Florida, USA. Cari van Schalkwyk of SACEMA was selected as a student participant, while the faculty included three SACEMA staff: John Hargrove, Brian Williams and Gavin Hitchcock.



Faculty and Students at the DAIDD clinic held in Gainesville, Florida, December 2013

The next DAIDD Clinic will take place 15-20 December 2014 in Florida. Details can be found on the website <http://ici3d.github.io/>.

Both clinics, MMED and DAIDD, continue to develop innovative ways of enriching real-world modelling discourse, encouraging mathematical modellers to engage meaningfully with important data, as well as encouraging epidemiologists and biologists to embrace the possibilities of dynamical modelling. The Clinics are expected to issue in sustained collaborations, and the most promising participants are nominated to apply for 6-week Exchange Scholar visits to researchers based in the other continent. One African student has completed such a visit, working with Steve Bellan the University of Texas, and another is currently at the University of California, San Francisco, working with Travis Porco. One American student, Sarah Ackley is currently at SACEMA working with John Hargrove [see item in this Newsletter]. Several other visits are being planned.

## Data management and visualisation in R, 23-27 June



Lecturers, Tutors and Participants at the R Data Management course held in Stellenbosch, June 2014

This intensive five-day course was well attended by postgraduate students and researchers, and aimed to develop competence and confidence in the management, exploration and visualisation of data, using the versatile, open-source statistical software package R.

Rationale for the course was our strong conviction that competence in an appropriate statistical package, as well as efficient data exploration, are essential starting points for building statistical models. Learning to efficiently manage, explore and visualise data not only boosts productivity, but is critical for data quality assurance purposes.

It was arguably the most interactive SACEMA course thus far, for a number of reasons. Firstly, the presentation style was a blend of slides, R script examples and tutorials that allowed participants to put every new concept immediately into practice. Secondly, different from all other statistics courses SACEMA had previously organised, this course was taught by SACEMA staff. Hence, the course was an important learning experience for all lecturers and tutors as well, facilitated by structured feedback sessions on course content, pace, and teaching style. Thirdly, the large variation in prior experiences with programming languages meant that some participants also acted as de facto tutors for their neighbours. Finally, participants were invited to conduct regular self-assessments of their competencies in data management, data exploration and visualisation throughout the duration of the course. Many thanks to all course participants for their enthusiasm and engagement, not only with the course content, but also with matters related to the course organisation. An even bigger thanks to all SACEMA staff for the countless hours that went into preparing all the course content, and ultimately delivering an innovative, high quality course.

Supported by confirmation from various sources that there is still a very large unmet need for this course, and encouraged by the very positive feedback from participants, we look forward to the next edition in 2015.



## **SACEMA Seminars**

The following seminars have been held from January to July:

22 January: Nelly Biondi, Health Division, Organisation for Economic Co-operation and Development (OECD): *OECD Health Statistics and Health at a Glance edition*

3 February: The Tolerogenic Vaccine: Is this the HIV Vaccine Breakthrough we are waiting for? Prof Frederick Murphy, University of Texas Medical Branch and STIAS Fellow: *Foundations of Viral Vaccinology*; Prof Jean-Marie Andrieu, University of Paris-Descartes: *Prospects for a Tolerogenic HIV vaccine*; Prof Marc H.V Van Regenmortel, University of Strasbourg and STIAS Fellow: *Specific and Heterospecific Antibody Responses to Viruses*

7 February: Adi Eyal, Code for South Africa: *Looking for love in several wrong places and how open data can put you on the right path*

12 February: Dr Wilfred Ndifon, African Institute for Mathematical Sciences (AIMS): *How chance, nature, and nurture shape T-cell receptor repertoires*

19 February: Cynthia Mazinu, SACEMA MSc Student: *Estimating treatment coverage in South African ART clinics based on the time trend of the CD4 count distribution at ART initiation and a dynamical epidemiological model*

21 February: Dr Joanna Lewis, University College, London: *Mixed-effects modelling of CD4 reconstitution in infants interrupting ART*

18 March: Prof Catherine Comiskey, Professor of Healthcare Statistics, Trinity College Dublin, Ireland: *Modelling Healthcare Outcomes: An overview of the work of the Centre for Practice and Healthcare Innovation*

28 March: Dr Paolo Denti, Clinical Pharmacology, University of Cape Town: *Application of Pharmacometrics to the Analysis of TB/HIV treatment data*

4 April: Dr Lungiswa Nkonki, Department of Community Health, University of Stellenbosch: *Conducting economic evaluations alongside community randomised controlled trials: methodological concerns, findings and lessons*

11 April: Prof Sarel J. Steel, Department of Statistics and Actuarial Sciences, University of Stellenbosch): *Multi-label classification*

29 April: Kassahun Workalemahu, University of Addis Ababa, Ethiopia: *Malaria disease transmission model with seasonal and temperature variations*

30 May: Nathan Geffen, University of Cape Town and editor of the online social justice news website, GroundUp: *Pre-approval access to experimental drugs: opportunities and pitfalls*

17 July: Sarah Ackley, University of California, San Francisco: *Estimating Tsetse Mortality from Ovarian Dissection Data.*

## UPCOMING EVENTS:

### **Bayesian Biostatistics, 20 – 24 October 2014**



Prof Emmanuel Lesaffre (Department of Biostatistics, Erasmus University Medical Center, Rotterdam, the Netherlands, and Catholic University of Leuven, Belgium) will again present this five-day course at Stellenbosch under the auspices of the SACEMA. The course will take place from 9 am to 4 pm daily from 20-24 October 2014, at the Stellenbosch Institute for Advanced Study (STIAS), adjacent to SACEMA. The closing date for early bird registration is 31 July 2014, and for later registration the closing date is 31 August 2014. More information and the

application form can be found at <http://www.sacema.org/node/20-24-october-2014-stellenbosch--bayesian-biostatistics>

### **Second workshop on incidence estimation using tests for recent infection**

SACEMA is hosting a second edition of the workshop on Incidence Estimation using Tests for Recent Infection. This is an intensive three day, face to face, pragmatic hands-on experience designed to familiarise data managers, health system managers, researchers, policy makers and others with the central concepts and practicalities of using markers for 'recent' HIV infection, as increasingly available in many cohorts and cross sectional surveys, to infer HIV incidence. The workshop is set for **17-19 September 2014**, at the Wallenberg Conference Centre on the Mostertsdrift Campus where SACEMA is based.

Participation is free of charge, though contingent on an accepted application (max 24 delegates due to limited capacity in the venue). Attendees are responsible for their own travel, accommodation and other local costs. Travel costs of some participants will be covered by the World Health Organisation (WHO), based on the candidates' profiles, country plans and needs. The closing date for applications is 31 July 2014. More information and the application form can be found at

<http://www.sacema.org/node/second-workshop-on-incidence-estimation-using-tests-for-recent-infection>

### **SACEMA Bursaries for 2015**

The call for SACEMA Bursaries for 2015 will be announced on our website shortly.