



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

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## **SACEMA NEWSLETTER**

### **No 14: December 2009**

The Director, staff and students of SACEMA would like to wish our friends and colleagues a joyous and peaceful holiday season and a prosperous New Year. We will be closing the wine cellar briefly from 23 December until 4 January 2010.

#### **NEWS:**

##### **MORTALITY AMONG HIV-POSITIVE WOMEN WITH HIGH CD 4 COUNTS**

Analysis of data from a project in Zimbabwe suggest that, for postpartum women in a developing country setting, even the earliest stages of HIV are associated with substantial mortality. A paper on this subject has been Fast Tracked for the journal AIDS; largely because the data are relatively rare, and the analysis is timely and relevant to current policy discussions underway regarding HAART initiation criteria in resource-poor areas and to mother-to-child transmission prevention interventions for resource poor areas.

Mortality was monitored over 24 months among 4495 HIV positive and 9562 HIV negative post partum women in Zimbabwe. In Cox models adjusting for age, risk of death remained significantly higher for HIV-positive women across the entire CD4 cell distribution up to 1000 cells/ $\mu$ l, compared to HIV-negative women. For HIV-positive women with CD4 counts at delivery  $>600$  cells/ $\mu$ l (mean = 803 cells/ $\mu$ l) the risk was more than 6 times higher than among the HIV-negative women who had a comparable CD4 cell count (mean = 782 cells/ $\mu$ l). These data suggest that for postpartum women in a developing country setting, even the earliest stages of HIV are associated with substantial mortality. Initiating lifelong treatment at the time of diagnosis for all HIV-positive pregnant women in developing countries may substantially reduce their mortality.

## SACEMA'S FIRST IN-HOUSE PHD

On 13 October 2009 Carel Pretorius became the first student working at the DST/NRF Centre of Excellence in Epidemiological Modelling and Analysis (SACEMA) to complete a PhD degree after successfully defending his PhD thesis titled: "An investigation into joint HIV and TB epidemics in South Africa". The work was supervised by Professor Kristian Müller-Nedebock of the Physics Department, Stellenbosch University. The event was the culmination of a long and unusual academic journey, which enabled him to take a multidisciplinary approach in his investigation of HIV and TB epidemics in South Africa. Mr Pretorius completed his first degree, in land surveying, at the University of Pretoria in 1997. He then moved to the University of the Witwatersrand and did an honours degree in pure mathematics in 1999 and an MSc in applied mathematics in 2006.

He joined SACEMA to study HIV and TB epidemics in South Africa. Using a unique data set from a thoroughly studied HIV-TB epidemic in Masiphumelele (a township near Cape Town), he developed a mathematical model which not only confirmed many expectations but also led to an unexpected result: ART treatment has the potential to control HIV transmission at a community level, indirectly also controlling the TB epidemic. He extended this analysis to HIV-TB epidemics at a national level, and developed models to account for demographical detail, adapting tools from fields as far apart as applied demography and statistical physics. His research results can best be described as a framework for integrating available epidemiological data, locally and nationally, with a toolkit of mathematical methods which can be continuously sharpened in accordance with the ever-changing (but not necessarily improving) picture of HIV and TB epidemics in South Africa. His work shed new light on the interplay between demographical and epidemiological processes, for example, on the role of intergenerational sex on the spread of HIV and provides methods for quantifying uncertainty in epidemiological models.



Dr Carel Pretorius (left) and SACEMA Director, Prof John Hargrove

## 2009 MSC & PHD GRADUATES

We are pleased to announce that in addition to the in-house graduates, the following SACEMA-supported students graduated in 2009:

Gesham Magombedze obtained a PhD from the National University of Science and Technology under the supervision of Dr W Garira. His thesis was titled: “Modelling the pathogenesis of Mycobacterium Tuberculosis infection and its treatment”.



Pictured above is Gesham at his graduation in December.

Kerry-Anne Cawse obtained an MSc from the University of the Witwatersrand under the supervision of Prof D Sherwell. Her thesis was titled “A New Model of Population Dynamics of HIV-1 In Vivo”.

Thembile Mzolo obtained an MSc from the University of Kwazulu Natal under the supervision of Dr H Mwambi. Her thesis was titled “Estimating Risk Determinants of HIV and TB in South Africa”.

We wish these students all the best with their future endeavours.

## EVENTS:

### **EPIDEMIOLOGY ADVANCED STUDY INSTITUTE (ASI) AND WORKSHOP**

Nelly Biondi, Joseph Ssebuliba and Kazeem Okosun attended the Economic Epidemiology Advanced Study Institute (ASI) and Workshop from 18 July to 5 August at Makerere University in Kampala, Uganda.

The workshop was sponsored by the Mathematical Biosciences Institute at Ohio State University, the Centre for Discrete Mathematics and Theoretical Computer Science at Rutgers University (DIMACS), the Mathematics of Information Technology and Complex Systems (MITACS), and SACEMA, and was supported by the US National Science Foundation, MITACS, SACEMA, and the Society for Mathematical Biology. A major aim of the ASI was to reinforce students' background in the developing field of economic epidemiology in order to be able to fully participate in the capstone interdisciplinary workshop and to either continue the research project they began during the institute or begin work on a new project upon their return to their home institution.

### **CIDA PROJECT STEERING COMMITTEE MEETING**

The CIDA Project Steering Committee meeting was held at the Wallenburg Centre, Stellenbosch on 16 October 2009. It was the first time that the meeting was held in the Cape.



Pictured from left to right are Mokgadi Tena (IDC), Modiegi Selematsela (DST), John Hargrove (SACEMA), Billie-Jean Nieuwenhuys (CIDA), Leslie Campbell (CIDA), Lynnemore Scheepers (SACEMA), Alex Welte (SACEMA), Mmapitso Mokotedi (DST) and Andrew Boule (IDEU).

## RESIGNATIONS:

SACEMA said goodbye to Dr Farai Nyabadza who left at the end of August to join the Mathematical Sciences Department at Stellenbosch University as a senior lecturer. Farai spent two years at SACEMA as postdoctoral research fellow in the modelling and analysis of HIV and TB.



Pictured with Dr Farai Nyabadza (middle) are MSc students, Josephine Ameh (left) and Asha Kalula (right).