

## **Simpact: Informing HIV prevention and treatment decisions through simulation**

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During a special session on 8 May at the Wallenberg Research Centre in Stellenbosch, a new software tool for research and decision support in HIV prevention and treatment was launched. *Simpact* – Wim Delva's brainchild – was developed by a multidisciplinary team of scientists from SACEMA, the International Centre for Reproductive Health at Ghent University in Belgium, the Center for Statistics at Hasselt University and the Computational Epidemiology Group at the University of Iowa. It can simulate the spread of HIV and estimate the impact and cost-effectiveness of various prevention and treatment interventions.

Hundreds of different purpose-specific models for HIV transmission, prevention and treatment have been developed over the past 25 years, but few have the flexibility of *Simpact*, which was designed to avoid the need to build ad-hoc models from scratch every time researchers and decision-makers want to address a new research or policy question. Another important asset of *Simpact* is that it is co-owned by SACEMA. This increases opportunities to make scientific advances and strengthen academic capacity in response to South Africa's specific needs and priorities in HIV modelling and analysis.

*Simpact* is an individual-based model for HIV transmission, prevention and treatment in a sexual network. An individual-based model can keep track of the history of events that happen to the individuals. Thus, it becomes possible to see exactly how many times an HIV-infected individual transmitted the virus by the end of his or her life, who became orphan due to the AIDS-related death of his or her parents and at what age, and what fraction of men and women engage in multiple, concurrent relationships at a given point in time.

In *Simpact*, the complexity of HIV transmission and any prevention and treatment interventions that may be simulated is easily adjusted. In addition to defining the composition of the population in which the epidemic will take place, *Simpact* users can specify which events are possible in a particular simulation. By default, events include HIV transmission, relationship formation and dissolution, antenatal care visits, pregnancy and birth, AIDS- and non-AIDS-related mortality, male circumcision, condom use, initiation and discontinuation of antiretroviral treatment, and HIV counselling and testing.

After the simulations are run, the generated data are analysed and interpreted using health economic and network analyses. *Simpact* allows researchers to combine several disciplines in the quest for effective and affordable measures to curb the on-going burden of HIV and AIDS, from social sciences and public health to statistics, computer science and health economics.

Rather than keeping it a purely academic modelling exercise, the *Simpact* team wants to invite policymakers, students and researchers to work together and use *Simpact* to shed light on complicated issues that are currently high on the policy and research agenda, such as the cost-effectiveness of combination HIV prevention, the potential impact of universal, immediate access to HIV treatment, and the role of age-disparate relationships and labour migration in the spread of HIV in South Africa.

As the policy-making process in HIV prevention and treatment necessarily takes into account multiple perspectives and sources of evidence, so too is *Simpact*'s ongoing further development and application led by a multidisciplinary team that is knowledgeable in medicine, biostatistics, public health, computer science, social science, operational research and health economics.

The Flemish Interuniversity Council (VLIR), the Flemish Research Fund (FWO), the agency for Innovation by Science and Technology (IWT) and the Canadian International Development Agency (CIDA) funded the project. For large simulations, the infrastructure of the Flemish Supercomputer Center (VSC) is used, funded by the Hercules Foundation and the Flemish Government.

For more information: visit <http://www.simpact.org/>

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