

ASSA2000 model

The Actuarial Society of South Africa (ASSA) is proud to announce the release of the latest version of its AIDS and demographic models, the so-called ASSA2000 model.

According to model there were 5.3 million people infected with HIV South Africa in 2000, of which around 236,000 were living with AIDS. Over the same year some 139,000 people are estimated to have died of AIDS (26% of all deaths in that year) and some 64,000 babies became infected from their mothers.

The model projects that without change in behaviour or medical interventions, a further 5 million people can be expected to die of AIDS over the next 10 years.

A "modest" change in behaviour and health intervention (namely, phasing in over the next 5 years of a mother-to-child intervention programme, a doubling of condom use, a reduction by 15% in the number of partners and the prevalence of sexually transmitted diseases) would result in there being 1.2 million fewer people infected with the virus in 10 years time than if there is no change. It would also prevent more than half the babies from becoming infected but unfortunately only save some 250,000 deaths over the next 10 years.

"There is still a great deal we don't understand about this epidemic and for some time to come the models will be in need of constant revision and updating when new data become available to improve their predictive accuracy", says Professor Rob Dorrington, convenor of the ASSA AIDS Committee responsible for building the model.

"There has recently been much debate about the extent of the epidemic and the Society hopes that the release of the model might help provide a clearer understanding of the dimensions of the epidemic. However, perhaps one of the greatest benefits of such mathematical modelling is to enable us to assess the impact of the epidemic under different scenarios."

The ASSA2000 model is the latest in a series of models developed by ASSA starting with the ASSA500 in 1996 and followed by the ASSA600 model in 1998. The 2000 refers to the fact that the model was calibrated, amongst other things, on data from the national survey of public antenatal clinics up to and including 2000, run by the Department of Health. Uniquely, however, the model is also calibrated on the results of an analysis of the latest mortality data.

The new model incorporates a number of improvements on the previous model, chief amongst these are:

- It incorporates up-to-date information,
- The fit to antenatal seroprevalence data has been improved,
- It allows for separate male and female assumptions,
- It limits the trends in mortality, fertility and future migration, and
- It allows for bimodal paediatric HIV survival, and various other technical innovations.

However, by far the most important development is that sexual behaviour is now modelled in much more detail than in the earlier versions taking into account such things as the:

- Risk-group of the partner,
- Number of new partners per annum,
- Number of sexual contacts per partner,
- Age of partner, and
- Likelihood that a condom was used.

The ASSA2000 model (also described as the 'full' model because it models the population as four separate population groups) is in fact one of a suite of models with the ASSA2000 label. Others in the range are:

- The ASSA2000 'lite', a less detailed version of the full model which is smaller and runs much faster,
- Provincial versions of the full model (release of these have been held up by the Department of Health's embargo on the release detailed provincial data from the 2000 antenatal survey),
- ASSA2000 Urban-Rural, a variation developed for application to other countries where there is limited data but clearly different urban and rural epidemics, and
- ASSA2000 multi-state model, a complex multi-state model used to model the impact of HIV/AIDS on a group of employees in some detail.

With the exception of the multi-state model, which owing to its complexity is not in the public domain, the models can be downloaded from the Society's website (assa.org.za/committees/aids/aids.htm). Also available at the website are two tables of summary output from the model for those who are interested in the results but not interested in downloading and running the model.

Future plans for development include the following:

- Redesigning the model to allow for more complex patterns of change behaviour suggested by observations from countries at a more advanced stage in the epidemic.
- Redesigning the model to allow for the modelling of various possible interventions, the chief being access to antiretroviral therapy.
- Adapting the model to allow for estimation of morbidity (e.g. the numbers at the various clinical stages of the disease) and in particular to measure the impact on TB.
- Developing an add-on program for estimating the numbers of orphans by various definitions (e.g. maternal, paternal and dual).