

9 August 2020

Cover note for ASSA Covid-19 model update

The modelling of Covid-19 epidemic requires the ongoing assessment of multiple factors that affect infection rates and disease progression. This is associated with significant uncertainty.

Uncertainty in the modelling process is not unique to South Africa but is observed across Covid-19 projection models internationally. Uncertainty arises due to factors such as underreporting of Covid-19 infections and deaths, lack of testing, undetected cases due to asymptomatic carriers and poor reporting in some areas. There is also great variation in the results of various clinical studies conducted over the short period of the pandemic making it difficult to draw definitive conclusions.

The ASSA Covid-19 model is a framework which facilitates the assimilation of various factors that affect the progression of the Covid-19 epidemic in the South African population. While there may be many other risk factors, the modelling team has aimed to focus on the most significant ones as well as those that are feasibly measurable. The key factors are:

- Rt: the number of cases caused by an individual transmitting the infection.
- Asymptomatic proportion: the proportion of cases that exhibit no symptoms, as well as those that are mild and severe.
- Hospitalisation rates: the proportion of cases requiring hospitalization (including those requiring ICU)
- Recovery rates from each stage of severity
- Infection fatality rates: the proportion of infected individuals that die
- Incubation period, and period of illness

The key updates with this version of the model are allowance for heterogeneity in contact rates, allowance for a portion of the population as non-susceptible, additional model pathways associated with hospitalization and deaths; more rigorous calibration to available South African data.

The report presents a variety of scenarios to demonstrate a range of trajectories for the infection in the South African population. The ASSA modelling team has not attached a likelihood to these various scenarios given the level of the unknowns. The various scenarios aim to support members of the Actuarial Society referencing the model for purposes such as assessing appropriate financial reserving and health resource planning.

The environment which we are considering is also subject to factors such as:

- the influence of government interventions;
- the extent of population compliance with non-pharmaceutical interventions including restriction of movement;
- access to treatment and availability of resources for testing;
- discovery of new treatments or prevention mechanisms.

These may all influence the trajectory of infections. At this stage the model does not include provincial variations and this is currently under development as well as the projections into 2021. As with all professional actuarial work, expert judgment is required when interpreting model results. Users of this ASSA Covid-19 model are urged to exercise caution when varying input parameters and when using outputs of the model. Significant contextual understanding of the disease, epidemiology and the supporting models is required to draw proper judgements.