

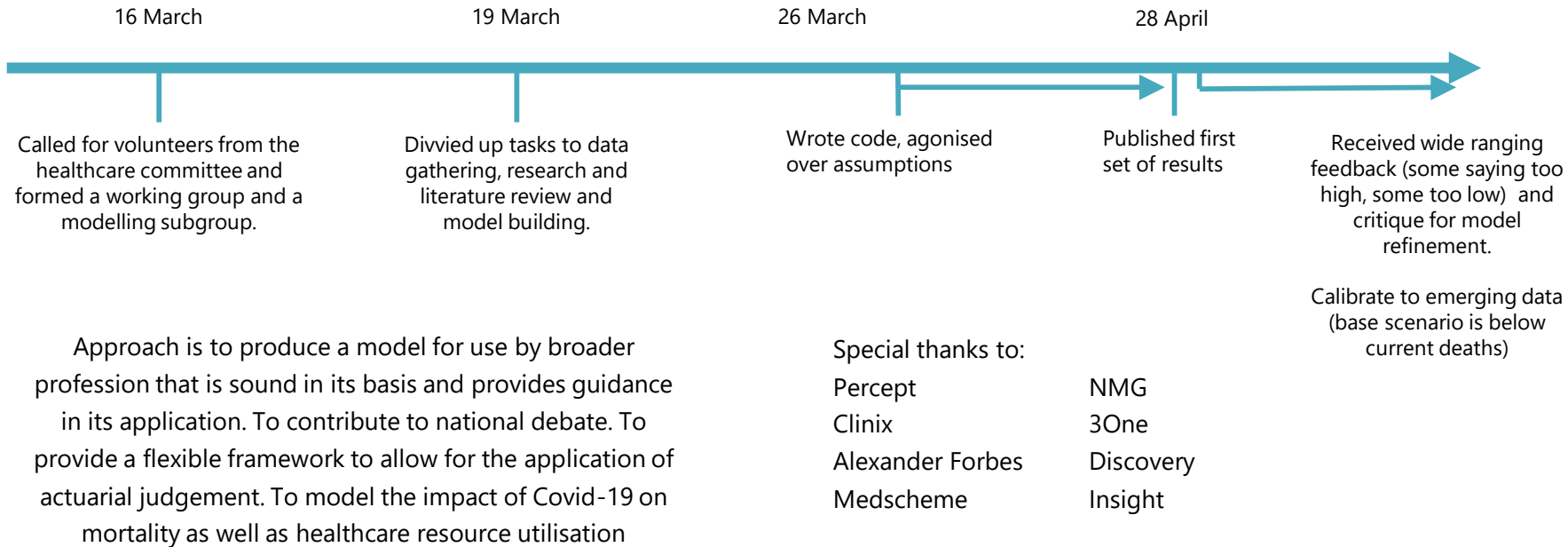


Quantifying Risk, Enabling Opportunity.

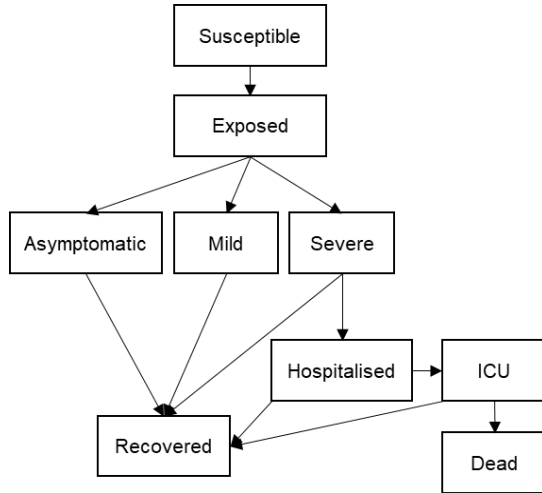
DOH Covid modelling symposium

Barry Childs, healthcare committee chair

2020 05 21



Model structure



Base parameters

- $R_0 = 3$
- Proportion of asymptomatic cases = 75%
- Relative Infectiousness of asymptomatic cases (to symptomatic cases) – 50%
- 30% of mild cases detected, all severe and critical cases detected*
- Lockdown effect = $60\% \times R_0$
- NPIs after lockdown = $75\% \times R_0$
- Infectiousness pre isolation: Asymptomatic 10 days, Mild 7 days, Severe 2.3 days,
- Severe isolated in hospital for 3.7 days
- Hospital stay: 10 days if not critical, 6 critical days if critical plus 10 days in ICU if recover or 6 if die
- Proportion of admissions ending in ICU = 21.3%.

Scenario 2 (else equal to base)

- $R_0 = 2.6$
- Asymptomatic proportion = 50%

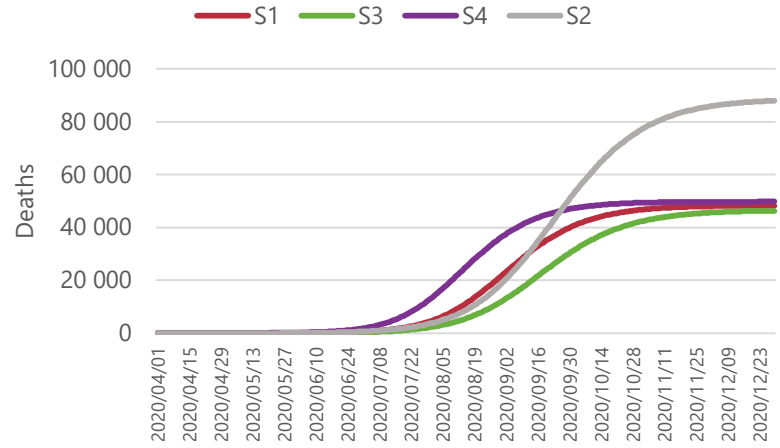
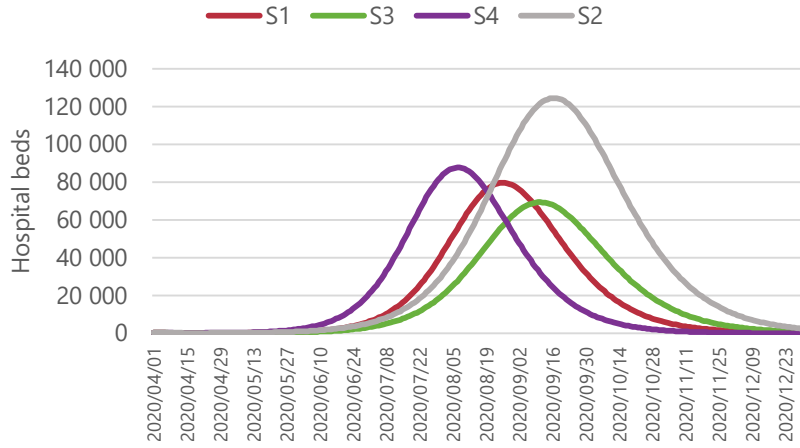
Scenario 3 (else equal to base)

- Lockdown effect = $50\% \times R_0$
- NPIs after lockdown effect = $70\% \times R_0$

Scenario 4 (else equal to base)

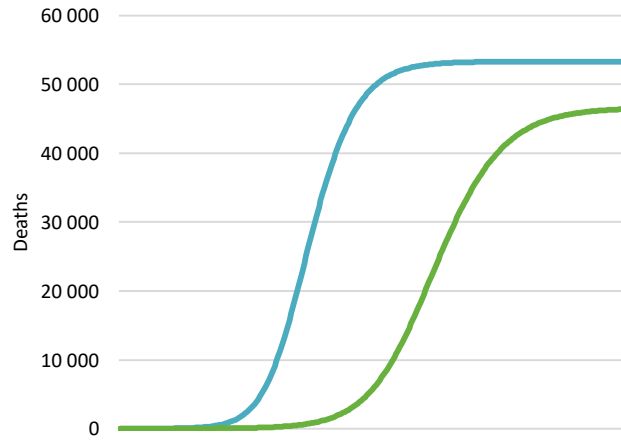
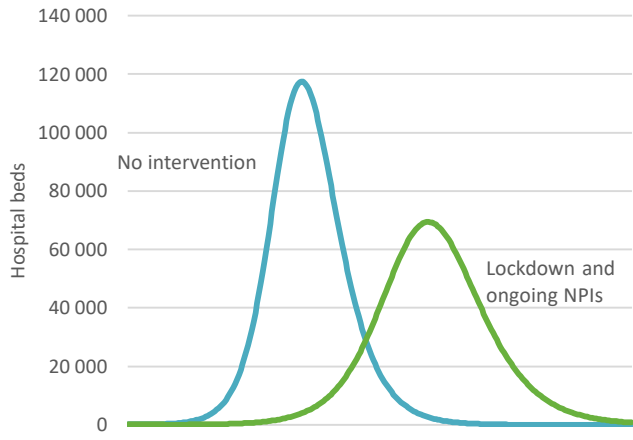
- Lockdown effect = $70\% \times R_0$
- NPIs after lockdown effect = $80\% \times R_0$

First set of scenarios



Model outputs illustrate sensitivity to some key parameter values. Lowering the Reproduction rate pushes curves back but overall figures remain similar unless R_0 can be maintained below 1. Altering asymptomatic assumption has a significant effect. Based on feedback and critique from the broader profession models and parameters are being refined.

Models

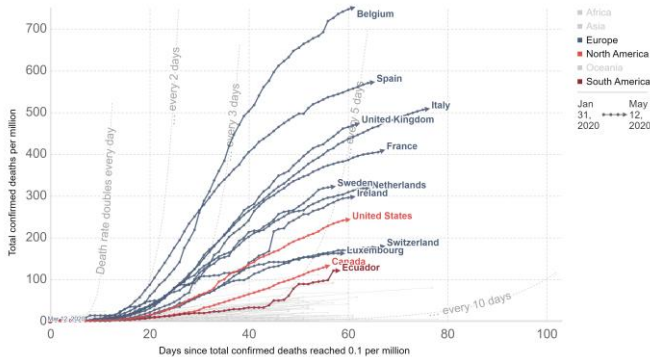


Models driven by parameters, informed by research and literature. Useful for predictions and policy testing. Sensitive to model structure and parameter choices. Much remains unknown. Model shortcomings such as spatial dynamics, population heterogeneity, variations in infectivity, etc still need to be allowed for.

International data

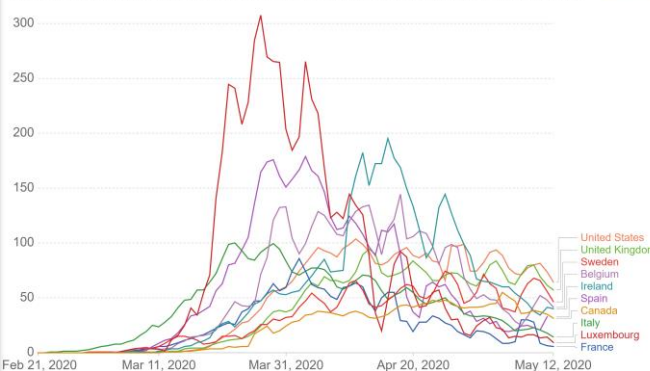
Total confirmed COVID-19 deaths per million: how rapidly are they increasing?

Shown are the total confirmed deaths per million people. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

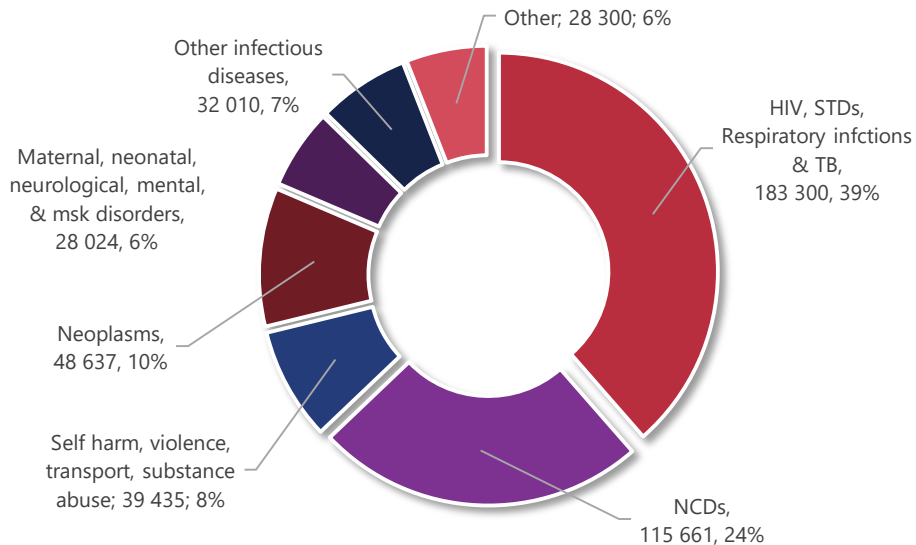


Daily confirmed COVID-19 cases per million, 3-day rolling average

The number of confirmed cases is lower than the number of total cases. The main reason for this is limited testing.



Worst affected countries starting to level off, topping out at 600 deaths per million (excl. Belgium*). Many countries, especially developing countries have followed a much lower path. Concerns remain about under reported deaths and excess mortality which will still aggravate figures, and re-emergence of cases



2017 Cause of death estimates

Global health data exchange

~ 1,300 deaths a day

Significant concern that management of other conditions fall by the way side due to focus on Covid-19

“In high burden settings, HIV, TB and malaria related deaths over 5 years may be increased by up to 10%, 20% and 36%, respectively, compared to if there were no COVID-19 epidemic. We estimate the greatest impact on HIV to be from interruption to ART, which may occur during a period of high or extremely high health system demand; for TB, we estimate the greatest impact is from reductions in timely diagnosis and treatment of new cases, which may result from a long period of COVID-19 suppression interventions”

Report 19 - The Potential Impact of the COVID-19 Epidemic on HIV, TB and Malaria in Low- and Middle-Income Countries, Imperial College London

Contributors to disease progression and effect

Latent factors

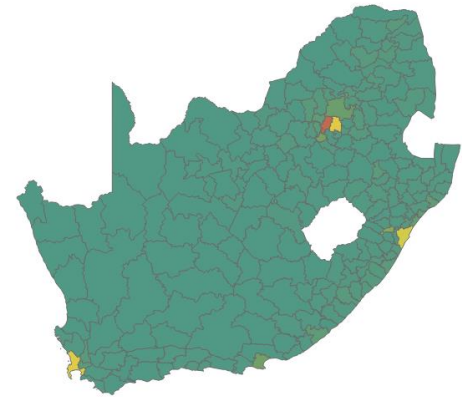
- Age profile** Young age profile by international standards should keep mortality rates low
- Comorbidities** Moderate relative burdens of NCDs
- HIV and TB** High burden but not yet indicated as significant risk factors. HIV not on treatment remain a concern
- Obesity** Moderate to high levels of obesity
- Density** High proportion of population in urban areas
Large geographies have low density

Policy factors

- Early lockdown** Early lockdown bought time for scaling up testing, planning, training, facility preparedness
- Testing** High levels of testing by international standards, positive rate of +/- 1/30 tests but delays are a problem
- Bed capacity** Overall hospitals bed capacity looks manageable
ICU capacity may still be breached if the surge comes
- Education Awareness Mobility NPI Compliance** High general awareness and education of hand washing, social distancing, mask wearing. Difficulties persist in compliance – some related to queuing for food, grants, etc

Share of men that are obese, 2016

Obesity is defined as having a body-mass index (BMI) equal to or greater than 30. Body mass index is a person's weight in kilograms divided by his height in metres squared.



Persons per km sq



Source: WHO, Global Health Observatory

OurWorldInData.org/obesity • CC BY