Adjustment for Website Code

Let $S_{e,t}$ be the "effective" number of the elderly in the susceptible population without outflow of newly infected:

$$S_{e,t} = Pop_{e,0} - \sum_{\tau=3}^{t} E_1 V^1_{(e,\tau-2)} - \sum_{\tau=3}^{t} (E_2 - E_1) V^2_{e,\tau-2}$$

where $Pop_{e,0} = 3{,}100{,}000$ is the initial population of the elderly.

Let $s_{e,t}$ be the share of "effective" number of the elderly in the susceptible population without outflow of newly infected:

$$s_{e,t} = \frac{S_{e,t}}{S_{e,t} + S_{y,t}}.$$

Then, the simulated mortality(severity) rate at tine t is given by the following equation:

$$\delta_t = \bar{\delta} \left(\frac{i_{e,t}}{i_{e,Tdata}} \right) \lambda \approx \bar{\delta} \left(\frac{s_{e,t}}{s_{e,Tdata}} \right) \lambda$$

where λ is the adjustment parameter, which can be different for the mortality rate and the severity rate.

Obtaining λ parameter

$$\frac{Pop_{e,0}}{Pop_{e,0}+Pop_{y,0}} = \frac{3.1m}{3.1m+9.1m+1.6m} = \frac{3.1m}{13.8m} = 0.2246$$

$$\begin{aligned}
&s_{e,Tdata} = 0.0977,\\
&s_{y,Tdata} = 1 - s_{e,Tdata} = 0.9023\\
&s_{e,SS} = 0.1564,\\
&s_{y,SS} = 1 - s_{e,SS} = 0.8436\\
&\delta_e = 7.42\%,\\
&\delta_y = 0.1063\%\\
&\delta_e^{ICU} = 4.9724\%,\\
&\delta_y^{ICU} = 0.3916\%
\end{aligned}$$

$$\boldsymbol{\frac{s_{e,SS}}{s_{e,Tdata}} = 1.6009}$$

$$\delta_{Tdata} \approx s_{e,Tdata}\delta_e + s_{y,Tdata}\delta_y = 0.0977 * 7.42\% + 0.9023 * 0.1063\% = 0.82\%$$
$$\delta_{SS} \approx s_{e,Tdata}\delta_e + s_{y,Tdata}\delta_y = 0.1564 * 7.42\% + 0.8436 * 0.1063\% = 1.25\%$$
$$\boldsymbol{\frac{\delta_{SS}}{\delta_{Tdata}} = \frac{1.25}{0.82} = 1.5230}$$

$$\delta_{Tdata}^{ICU} \approx s_{e,Tdata}\delta_e^{ICU} + s_{y,Tdata}\delta_y^{ICU} = 0.0977 * 4.9724\% + 0.9023 * 0.3916\% = 0.84\%$$
$$\delta_{SS}^{ICU} \approx s_{e,Tdata}\delta_e^{ICU} + s_{y,Tdata}\delta_y^{ICU} = 0.1564 * 4.9724\% + 0.8436 * 0.3916\% = 1.11\%$$

$$\boldsymbol{\frac{\delta_{SS}}{\delta_{Tdata}} = \frac{1.11}{0.84} = 1.3204}$$

$$\lambda_{death} = \left(\frac{\delta_{SS}}{\delta_{Tdata}}\right)\left(\frac{s_{e,SS}}{s_{e,Tdata}}\right)^{-1} = \frac{1.5230}{1.6009} = \boldsymbol{0.9513}$$

$$\lambda_{ICU} = \left(\frac{\delta_{SS}^{ICU}}{\delta_{Tdata}^{ICU}}\right)\left(\frac{s_{e,SS}}{s_{e,Tdata}}\right)^{-1} = \frac{1.3204}{1.6009} = \boldsymbol{0.8248}$$