

$$S_t = -\beta_{SA}SA - \beta_{SI}SI - \mu S, \quad (1)$$

$$E_t = \beta_{SA}SA - \beta_{SI}SI - (\sigma_A + \sigma_I)E, \quad (2)$$

$$A_t = \sigma_A E - M_{AR}A, \quad (3)$$

$$AR_t = M_{AR}A, \quad (4)$$

$$I_t = \sigma_I E - MI, \quad (5)$$

$$H_t = \gamma MI - (1 - \omega)\chi H - \omega\psi H, \quad (6)$$

$$R_t = (1 - \gamma)MI + (1 - \omega)\chi H, \quad (7)$$

$$D_t = \omega\psi H. \quad (8)$$

We determine the optimal parameters by minimizing the Euclidean distance  $\mathcal{N}$  between the time series generated by the model (num) and the corresponding observed time series (obs),

$$\mathcal{N} = \sum_i \left( |\log(C_{\text{num}}(t_i)) - \log(C_{\text{obs}}(t_i))|^2 + |\log(D_{\text{num}}(t_i)) - \log(D_{\text{obs}}(t_i))|^2 \right) \quad (9)$$

where the index  $i$  identifies a point in the time series. The optimization tries to reproduce the number of total reported cases ( $C(t) = I(t) + H(t) + R(t) + D(t)$ ) and the total number of deceased ( $D(t)$ ).

We can account for a change in the parameters due to the lockdown by imposing a time dependence on the transmission rates  $\beta$ :

$$\beta_{IS}(t) = \beta_{IS} \left[ \eta_{IS} + (1 - \eta_{IS}) \frac{1 - \tanh[2(t - t_q)]}{2} \right], \quad (10)$$

$$\beta_{AS}(t) = \beta_{AS} \left[ \eta_{AS} + (1 - \eta_{AS}) \frac{1 - \tanh[2(t - t_q)]}{2} \right]. \quad (11)$$

This causes the transmission rates  $\beta_{IS}$  and  $\beta_{AS}$  to decrease abruptly by a factor of  $\eta_{IS}$  and  $\eta_{AS}$  respectively at the time  $t_q$  when the lockdown was imposed.

		Median ( $t_q = 3$ )	Median ( $t_q = 16$ )	Initial value
Population	$N$		2,693,976	
Initial populations	$(I_0, H_0, D_0)$		(297, 134, 6)	
Non COVID-19 death rate [per day]	$\mu$		$5.79 \times 10^{-7}$	
Transmission rate, $S \rightarrow I$ [per day]	$\beta_{IS}$	0.35(0.28 – 0.41)	0.32(0.29 – 0.35)	$c \in U[0, 1]$