The parameters used as input for the ICM models are:-

* infection-to-death distribution[(Verity et al. 2020)](https://paperpile.com/c/pSvLzB/nNU5): We have performed the sensitivity of the choice in [(Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/SuTG) and found our fits and main conclusions are robust under the changes.
* Infection fatality ratio(IFR)[(Murhekar et al. 2021; Bhattacharyya et al. 2020; Bommer and Vollmer 2020)](https://paperpile.com/c/pSvLzB/ezjm+u6Tb+9vsQ): We used a range of values for our prior for IFR. We tried three different priors with mean 1%, 0.4% and 0.1%. We found that the model fits for deaths and Rt are more or less the same for all three choices but certainly our estimates for total infections changes. This implies the ascertainment of cases (positive results) will be affected.
* Generation Distribution[(Bi et al. 2020)](https://paperpile.com/c/pSvLzB/7YGu): We performed a sensitivity towards the choice of the generation distribution in [(Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/SuTG) and found our models to be robust against various choices. It has a very minimal effect on estimation time varying reproduction number and total infections inferred by the model.
* R0 prior[(Liu et al. 2020; Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/9QVd+SuTG): We used the R0 prior suggested in both studies. We did run sensitivity on a few other choices and found that our prior choice affected the inferred Rt values for only the first few days and subsequent dynamics are the same irrespective of the choice.
* Seeding[(Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/SuTG): As discussed in [(Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/SuTG) we validated our seeding scheme through an importance sampling leave-one-out cross validation scheme[(Vehtari, Gelman, and Gabry 2017; Bürkner, Gabry, and Vehtari 2020)](https://paperpile.com/c/pSvLzB/9szM+VQDF).

Different versions of ICM model has been applied to 11 european countries in [(Flaxman et al. 2020)](https://paperpile.com/c/pSvLzB/SuTG). On a subregional basis the model is used in the USA [(Unwin et al. 2020)](https://paperpile.com/c/pSvLzB/KNMH), Brazil[(Mellan et al. 2020; Candido et al. 2020)](https://paperpile.com/c/pSvLzB/CcRP+7iur) and Italy[(Vollmer et al. 2020)](https://paperpile.com/c/pSvLzB/fCyM). At a local level work the model is used for producing daily estimates for all local and regions in the UK[(Mishra et al. 2020; Gandy and Mishra 2021)](https://paperpile.com/c/pSvLzB/YAw8+teVj). It is also used by Scotland government [(“Coronavirus (COVID-19): Modelling the Epidemic” n.d.)](https://paperpile.com/c/pSvLzB/SYr9) and New York State government[(Cuomo 2020)](https://paperpile.com/c/pSvLzB/N68F).

[Bhattacharyya, Rupam, Ritwik Bhaduri, Ritoban Kundu, Maxwell Salvatore, and Bhramar Mukherjee. 2020. “Reconciling Epidemiological Models with Misclassified Case-Counts for SARS-CoV-2 with Seroprevalence Surveys: A Case Study in Delhi, India.” *bioRxiv*. medRxiv. https://doi.org/](http://paperpile.com/b/pSvLzB/u6Tb)[10.1101/2020.07.31.20166249](http://dx.doi.org/10.1101/2020.07.31.20166249)[.](http://paperpile.com/b/pSvLzB/u6Tb)

[Bi, Qifang, Yongsheng Wu, Shujiang Mei, Chenfei Ye, Xuan Zou, Zhen Zhang, Xiaojian Liu, et al. 2020. “Epidemiology and Transmission of COVID-19 in 391 Cases and 1286 of Their Close Contacts in Shenzhen, China: A Retrospective Cohort Study.” *The Lancet Infectious Diseases* 20 (8): 911–19.](http://paperpile.com/b/pSvLzB/7YGu)

[Bommer, Christian, and Sebastian Vollmer. 2020. “Average Detection Rate of SARS-CoV-2 Infections Is Estimated around Six Percent.” *The Lancet Infectious Diseases*.](http://paperpile.com/b/pSvLzB/9vsQ) <https://reason.com/wp-content/uploads/2020/04/Bommer-Vollmer-2020-COVID-19-detection-April-2nd.pdf>[.](http://paperpile.com/b/pSvLzB/9vsQ)

[Bürkner, Paul-Christian, Jonah Gabry, and Aki Vehtari. 2020. “Approximate Leave-Future-out Cross-Validation for Bayesian Time Series Models.” *Journal of Statistical Computation and Simulation*, June, 1–25.](http://paperpile.com/b/pSvLzB/VQDF)

[Candido, Darlan S., Ingra M. Claro, Jaqueline G. de Jesus, William M. Souza, Filipe R. R. Moreira, Simon Dellicour, Thomas A. Mellan, et al. 2020. “Evolution and Epidemic Spread of SARS-CoV-2 in Brazil.” *Science*, July. https://doi.org/](http://paperpile.com/b/pSvLzB/7iur)[10.1126/science.abd2161](http://dx.doi.org/10.1126/science.abd2161)[.](http://paperpile.com/b/pSvLzB/7iur)

[“Coronavirus (COVID-19): Modelling the Epidemic.” n.d. Accessed March 17, 2021.](http://paperpile.com/b/pSvLzB/SYr9) <https://www.gov.scot/collections/coronavirus-covid-19-modelling-the-epidemic/>[.](http://paperpile.com/b/pSvLzB/SYr9)

[Cuomo, Andrew. 2020. *American Crisis: Leadership Lessons from the COVID-19 Pandemic*. Crown.](http://paperpile.com/b/pSvLzB/N68F)

[Flaxman, Seth, Swapnil Mishra, Axel Gandy, H. Juliette T. Unwin, Thomas A. Mellan, Helen Coupland, Charles Whittaker, et al. 2020. “Estimating the Effects of Non-Pharmaceutical Interventions on COVID-19 in Europe.” *Nature*, June, 1–8.](http://paperpile.com/b/pSvLzB/SuTG)

[Gandy, Axel, and Swapnil Mishra. 2021. *ImperialCollegeLondon/covid19local: Website Release for Wednesday 1tth Mar 2021, New Doi for the Week*. https://doi.org/](http://paperpile.com/b/pSvLzB/teVj)[10.5281/zenodo.4609660](http://dx.doi.org/10.5281/zenodo.4609660)[.](http://paperpile.com/b/pSvLzB/teVj)

[Liu, Ying, Albert A. Gayle, Annelies Wilder-Smith, and Joacim Rocklöv. 2020. “The Reproductive Number of COVID-19 Is Higher Compared to SARS Coronavirus.” *Journal of Travel Medicine* 27 (2). https://doi.org/](http://paperpile.com/b/pSvLzB/9QVd)[10.1093/jtm/taaa021](http://dx.doi.org/10.1093/jtm/taaa021)[.](http://paperpile.com/b/pSvLzB/9QVd)

[Mellan, Thomas A., Henrique H. Hoeltgebaum, Swapnil Mishra, Charlie Whittaker, Ricardo P. Schnekenberg, Axel Gandy, H. Juliette T. Unwin, Michaela A. C. Vollmer, Helen Coupland, and Iwona Hawryluk. 2020. “Subnational Analysis of the COVID-19 Epidemic in Brazil.” *medRxiv*.](http://paperpile.com/b/pSvLzB/CcRP)

[Mishra, Swapnil, Jamie Scott, Harrison Zhu, Neil M. Ferguson, Samir Bhatt, Seth Flaxman, and Axel Gandy. 2020. “A COVID-19 Model for Local Authorities of the United Kingdom.” *medRxiv*, November, 2020.11.24.20236661.](http://paperpile.com/b/pSvLzB/YAw8)

[Murhekar, Manoj V., Tarun Bhatnagar, Sriram Selvaraju, V. Saravanakumar, Jeromie Wesley Vivian Thangaraj, Naman Shah, Muthusamy Santhosh Kumar, et al. 2021. “SARS-CoV-2 Antibody Seroprevalence in India, August-September, 2020: Findings from the Second Nationwide Household Serosurvey.” *The Lancet. Global Health* 9 (3): e257–66.](http://paperpile.com/b/pSvLzB/ezjm)

[Unwin, H. Juliette T., Swapnil Mishra, Valerie C. Bradley, Axel Gandy, Thomas A. Mellan, Helen Coupland, Jonathan Ish-Horowicz, et al. 2020. “State-Level Tracking of COVID-19 in the United States.” *Nature Communications* 11 (1): 6189.](http://paperpile.com/b/pSvLzB/KNMH)

[Vehtari, Aki, Andrew Gelman, and Jonah Gabry. 2017. “Practical Bayesian Model Evaluation Using Leave-One-out Cross-Validation and WAIC.” *Statistics and Computing* 27 (5): 1413–32.](http://paperpile.com/b/pSvLzB/9szM)

[Verity, Robert, Lucy C. Okell, Ilaria Dorigatti, Peter Winskill, Charles Whittaker, Natsuko Imai, Gina Cuomo-Dannenburg, et al. 2020. “Estimates of the Severity of Coronavirus Disease 2019: A Model-Based Analysis.” *The Lancet Infectious Diseases* 20 (6): 669–77.](http://paperpile.com/b/pSvLzB/nNU5)

[Vollmer, Michaela A. C., Swapnil Mishra, H. Juliette T. Unwin, Axel Gandy, Thomas A. Mellan, Valerie Bradley, Harrison Zhu, et al. 2020. “A Sub-National Analysis of the Rate of Transmission of COVID-19 in Italy.” *medRxiv*, May, 2020.05.05.20089359.](http://paperpile.com/b/pSvLzB/fCyM)