**Model Parameters**

# CHANGING PARAMETERS ACROSS MODELS

| **Similar to all countries** | **Value** | **Reference** |
| --- | --- | --- |
| *Average basic reproductive number, R0* | 1.1, 1.3,1.5,1.7 | Scenarios. R0 > 1 implies contagion phase continues |
| *Vaccination strategy* | Cascading and prioritising age groups  Age-blinded | Scenarios |

|  |  |  |
| --- | --- | --- |
| **For each country** | **Value** | **Reference** |
| *Vaccination coverage per age group* | From current vaccination coverage up to ~90%, by 10% | Scenarios |
| *Maximum vaccines per day (MVC)* | Country average in the last 4 months, twice average, thrice average and amount to cover 80% in 185 days | Scenarios |

# FIXED SEIR PARAMETERS ACROSS MODELS AND COUNTRIES

|  |  |  |
| --- | --- | --- |
|  | **Value** | **Reference** |
| *Length of simulation* | 365 days | Assumed |
| *Time sliding window step* | 0.1 days | Assumed |
| *Mean Incubation Period* | 4.6 days | Estimated to be 5.1 days ([Linton et al.](https://www.medrxiv.org/content/medrxiv/early/2020/01/28/2020.01.26.20018754.full.pdf); [Li et al.](https://www.nejm.org/doi/full/10.1056/NEJMoa2001316) The last 0.5 days are included in the I\_MILD and I\_CASE states to capture pre-symptomatic infectivity |
| *Generation Time* | 6.75 days | [Bi et al](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(20)30287-5/fulltext) |
| *Mean Duration in Mild Infection* | 2.1 days | Incorporates 0.5 days of infectiousness prior to symptoms; with parameters below ~95% of all infections are mild. In combination with mean duration in I\_CASE this gives a mean generation time as above |
| *Mean Duration in Infection case* | 4.5 days | Mean onset-to-admission of 4 days. Values in the literature range from 1.2 to 12 days. Includes 0.5 days of infectiousness prior to symptom onset |
| *Mean Duration of Hospitalisation for non-critical Cases if survive* | 9 days | Median value from five studies ([Sreevalsan-Nair et al.](https://www.medrxiv.org/content/10.1101/2020.04.17.20069724v4), [Haw et al.](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7506175/), [Hawryluk et al.](https://www.medrxiv.org/content/10.1101/2020.07.15.20154617v2), [Oliveira et al.](https://www.medrxiv.org/content/10.1101/2020.08.25.20181909v1), South African COVID-19 Modelling Consortium). Range from 8-15 days. |
| *Mean Duration of Hospitalisation for non-critical Cases if die* | 9 days | As above |
| *Mean duration of Critical Care if survive* | 14.8 days | Mean duration in ICU of 13.3 days [Pritchard et al.](https://www.medrxiv.org/content/10.1101/2020.07.17.20155218v4.full). Ratio of duration in critical care if die: duration in critical care if survive of 0.75 and 60.1% probability of survival in ICU ([ICNARC report](https://www.icnarc.org/Our-Audit/Audits/Cmp/Reports), from UK data, 16 October 2020) |
| *Mean duration of Critical Care if die* | 11.1 days | Mean duration in ICU of 13.3 days [Pritchard et al.](https://www.medrxiv.org/content/10.1101/2020.07.17.20155218v4.full). Ratio of duration in critical care if die: duration in critical care if survive of 0.75 and 60.1% probability of survival in ICU ([ICNARC report](https://www.icnarc.org/Our-Audit/Audits/Cmp/Reports), from UK data, 16 October 2020) |
| *Mean duration of Stepdown post ICU* | 3 days | Working assumption based on unpublished UK data |
| *Mean duration of hospitalisation if require ICU but do not receive it and die* | 1 day | Working assumption |
| *Mean duration of hospitalisation if require ICU but do not receive it and survive* | 7.4 days | Working assumption (Half duration of ICU and survive) |
| *Mean duration of hospitalisation if require Oxygen but do not receive it and die* | 4.5 days | Working assumption (Half duration of Oxygen and die) |
| *Mean duration of hospitalisation if require Oxygen but do not receive it and survive* | 4.5 days | Working assumption (Half duration of ICU and survive) |
| *Probability of death if require critical care but do not receive it* | 95% | Working assumption based on expert clinical opinion |
| *Probability of death if require hospitalisation but do not receive it* | 60% | Working assumption based on expert clinical opinion |

# FIXED VACCINE PARAMETERS ACROSS MODELS AND COUNTRIES

|  |  |  |
| --- | --- | --- |
|  | **Value** | **Reference** |
| *Duration of vaccine immunity* | 365 days | Assumed |
| *Vaccine efficacy infection* | 60% | Based on recent studies |
| *Vaccine efficacy disease* | 90% | Based on recent studies |
| *Duration vaccine delay* | 14 days | Based on recent studies |

# AGE-SPECIFIC FIXED PARAMETERS ACROSS COUNTRIES AND MODELS

| **Age-Group** | **Proportion of Infections Hospitalised** | **Proportion of hospitalised cases requiring critical care** | **Proportion of hospital deaths occurring in ICU** | **Proportion of non-critical care cases dying** | **Proportion of critical care cases dying** |
| --- | --- | --- | --- | --- | --- |
| *0 to 4* | 0.001 | 0.181 | 0.8 | 0.013 | 0.227 |
| *5 to 9* | 0.001 | 0.181 | 0.8 | 0.014 | 0.252 |
| *10 to 14* | 0.002 | 0.181 | 0.8 | 0.016 | 0.281 |
| *15 to 19* | 0.002 | 0.137 | 0.8 | 0.016 | 0.413 |
| *20 to 24* | 0.003 | 0.122 | 0.8 | 0.018 | 0.518 |
| *25 to 29* | 0.005 | 0.123 | 0.8 | 0.020 | 0.573 |
| *30 to 34* | 0.007 | 0.136 | 0.8 | 0.023 | 0.576 |
| *35 to 39* | 0.009 | 0.161 | 0.8 | 0.026 | 0.543 |
| *40 to 44* | 0.013 | 0.197 | 0.8 | 0.030 | 0.494 |
| *45 to 49* | 0.018 | 0.242 | 0.8 | 0.036 | 0.447 |
| *50 to 54* | 0.025 | 0.289 | 0.8 | 0.042 | 0.417 |
| *55 to 59* | 0.036 | 0.327 | 0.8 | 0.050 | 0.411 |
| *60 to 64* | 0.050 | 0.337 | 0.8 | 0.056 | 0.443 |
| *65 to 69* | 0.071 | 0.309 | 0.8 | 0.060 | 0.539 |
| *70 to 74* | 0.100 | 0.244 | 0.8 | 0.123 | 0.570 |
| *75 to 79* | 0.140 | 0.160 | 0.8 | 0.184 | 0.643 |
| *80+* | 0.233 | 0.057 | 0.8 | 0.341 | 0.993 |
| *Source* | [Salje et al.](http://dx.doi.org/10.1126/science.abc3517) | [Salje et al.](http://dx.doi.org/10.1126/science.abc3517) | Assumed | Calculated from IFR in [Report 34](https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-34-ifr/) | Calculated from IFR in [Report 34](https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-34-ifr/) |

# FIXED PARAMETERS WITHIN EACH COUNTRY

|  |  |  |
| --- | --- | --- |
| **For each country** | **Value** | **Reference** |
| *Population* | By age groups | <https://mrc-ide.github.io/squire> |
| *Susceptible* | Population – number of already vaccinated |  |
| *Mixing matrix* | Matrix by age groups with probability of contact between them | <https://mrc-ide.github.io/squire> |
| *Seeding cases* | According to population size | Initial number of cases seeding the epidemic |
| *Hospital bed capacity* | By country | General bed capacity. <https://mrc-ide.github.io/squire> |
| *ICU bed capacity* | By country | ICU bed capacity. <https://mrc-ide.github.io/squire> |