**Model parameters**

Table 1S. Social and demographic parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Unit** | **Current value** | **References** |
| Population | number | 500 896 | https://stat.gov.kz |
| * children of preschool age | % | 3 |
| * schoolchildren | % | 14 |
| * students | % | 7 |
| * workers | % | 61 |
| * retired | % | 15 |
| Total families | number | 173501 |
| * 1 person family | % | 18,9 |
| * 2 persons family | % | 27,2 |
| * 3 persons family | % | 19,1 |
| * 4 persons family | % | 15,9 |
| * 5 persons family | % | 18,9 |
| Total workers | number of people | 301785 |
| * in enterprises with a staff of up to 100 people | % | 20 |
| * in enterprises with a staff of up to 250 people | % | 18 |
| * in enterprises with a staff of up to 500 people | % | 62 |
| Owners of personal vehicles | % | 21 |
| Occupancy rate for a group in kindergartens | number of people | 25 | Model rules for the activities of educational organizations  https://adilet.zan.kz/rus/docs/V1800017657 |
| Group occupancy rate in schools | number of people | 25 |
| Group occupancy rate in university | number of people | 25 |
| Average attendance of one "convenience store" | number of people | 50 | https://karaganda.adresa-telefony.ru/produktovye\_magaziny#: |
| Number of clinics | number | 7 | https://stat.gov.kz |
| Average bus capacity | number of people | 60 | In average |

Table 2S. Epidemiological parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Unit** | **Current value** | **References** |
| Average daily contact | number | 6 | [51] |
| Average incubation period | day | 6 | [53] |
| Hospitalization rate | % | 29 | Ministry of Health of the Republic of Kazakhstan |
| Children hospitalization rate |  | 8,1% |
| Case severity |  |  |
| * mild |  | 74% |
| * moderate |  | 23% |
| * severe |  | 2% |
| * critical (inpatient, ventilation) |  | 1% |
| Fatality rate | % | 1,1 |
| Critical fatality rate | % | 91 |
| Duration of outpatient treatment | day | triangular(8,10,14) |
| Duration of inpatient treatment | day | triangular(15,20,28) |
| Duration of critical care (invasively ventilated) | day | triangular(9,10,14) |

Table 3S. Infection by location in the simulated scenarios

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario | Total  cases | At home | At work | In transport | At univers. | At school | At preschool | In mall |
| BS | 471746 | 201826 (43%) | 135605 (29%) | 73682 (16%) | 11607 (2%) | 24807 (5%) | 11177 (2%) | 13042 (3%) |
| SC | 438610 | 218731 (50%) | 137590 (31%) | 71107 (16%) | 0 | 0 | 0 | 11182 (3%) |
| MV | 215715 | 101481 (47%) | 60138 (28%) | 32597 (15%) | 3574 (2%) | 9373 (4%) | 5477 (3%) | 3075 (1%) |
| VS | 307381 | 132894 (43%) | 91667 (30%) | 49289 (16%) | 5874 (2%) | 14703 (5%) | 7416 (2%) | 5538 (2%) |
| CM | 604 | 270 (45%) | 215 (35%) | 113 (19%) | 0 | 0 | 0 | 6 (1%) |
| RS | 145044 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Table 4S. Age groups infection transmission comparison

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Scenario | Total cases | Age group | | | |
| 0-17 | 18-25 | 26-59 | 60+ |
| BS | 471746 | 85604 (18%) | 35075 (7%) | 292562 (62%) | 58505 (12%) |
| SC | 438610 | 70513 (16%) | 28362 (6%) | 285168 (65%) | 54567 (12%) |
| MV | 215715 | 36429 (17%) | 13860 (6%) | 144711 (67%) | 20715 (10%) |
| VS | 307381 | 52036 (17%) | 20354 (7%) | 203043 (66%) | 31948 (10%) |
| CM | 604 | 63 (10%) | 17 (3%) | 471 (78%) | 53 (9%) |
| RS | 145044 | 11604 (8%) | 10153 (7%) | 55117 (38%) | 68171 (47%) |

Table 5S. Hospital beds needed

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenario | BS | SC | MW | VS | CM | RS |
| Total number of severe cases needing beds (unconstrained by bed availability) | 7454 | 6930 | 3408 | 4857 | 10 | 2292 |
| Total number of severe patients admitted and in a bed (capped by bed availability) | 4256 | 4256 | 3408 | 4256 | 10 | 2292 |
| % Available beds for severe patients that are currently occupied | 100% | 100% | 80% | 100% | 0% | 54% |
| Number of additional beds needed to treat all severe patients who need them | 3198 | 2675 | - | 601 | - | - |
| Total number of critical cases needing beds (unconstrained by bed availability) | 6699 | 6228 | 3063 | 4365 | 9 | 2060 |
| Total number of critical patients admitted and in a bed (capped by bed availability) | 202 | 202 | 202 | 202 | 9 | 202 |
| % Available beds for critical patients that are currently occupied | 100% | 100% | 100% | 100% | 4% | 100% |
| Number of additional beds needed to treat all critical patients who need them | 6496 | 6026 | 2861 | 4162 | - | 1857 |

Table 6S. The costs of goods

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | BS | SC | MW | VS | CM | RS |
| Hygiene | $325498 | $305174 | $163439 | $224,683 | $665 | $109787 |
| PPE | $681549 | $655629 | $452237 | $552,981 | $4,204 | $351771 |
| Diagnostics | $69840 | $69840 | $67320 | $69,840 | $13,088 | $63720 |
| Pharmaceuticals | $4614981 | $4614,981 | $3776023 | $4,614,981 | $26,438 | $2588645 |
| Biomedical Equipment & Non-consumables | $39417714 | $39417,714 | $32972178 | $39,417,714 | $370,944 | $23849801 |
| Biomedical Consumables & Accessories | $65392 | $65392 | $56682 | $65,392 | $1,015 | $44356 |
| TOTAL | $45174975 | $45128731 | $37487881 | $44945592 | $416354 | $27008080 |