**EXPOSURE DIAGRAM**

Note that the parameter associated with the arrow between a source state and a sink state represents the daily transition probability to that sink state conditional on occupancy of the source state. Also note that prevalence across all 5 states (including mortality) sum to 1.

A diagram of a cat

Description automatically generated

**PARAMETER TABLE**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Description** | **Status** | **Value** |
|  | Daily incidence probability from TMREL to mild | Known | Sampled from KI data |
|  | Daily incidence probability from mild to MAM | Known | Sampled from KI data |
|  | Daily incidence rate from MAM to SAM | Known | Sampled from KI data |
|  | **Daily recovery probability from mild to TMREL** | **Unknown** | **Solved below** |
|  | **Daily recovery probability from MAM to mild, pooled across treated and untreated** | **Unknown** | **Solved below** |
|  | **Daily recovery probability from SAM to MAM for those untreated or ineffectively treated** | **Unknown** | **Solved below** |
|  | Daily recovery probability to mild of effectively treated SAM | Known | rate\_to\_prob(r\_sam\_ux) |
|  | Daily mortality probability from TMREL | Known | rate\_to\_prob(mort\_cat\_4); from GBD (see CGF risk effects model document for more details) |
|  | Daily mortality probability from mild | Known | rate\_to\_prob(mort\_cat\_3); from GBD (see CGF risk effects model document for more details) |
|  | Daily mortality probability from MAM | Known | rate\_to\_prob(mort\_cat\_2); from GBD (see CGF risk effects model document for more details) |
|  | Daily mortality probability from SAM | Known | rate\_to\_prob(mort\_cat\_1); from GBD (see CGF risk effects model document for more details) |
|  | Probability of “birth” into TMREL from death pool | Known | Prev cat 4; from GBD |
|  | Probability of “birth” into mild from death pool | Known | Prev cat 3; from GBD |
|  | Probability of “birth” into MAM from death pool | Known | Prev cat 2; from GBD |
|  | Probability of “birth” into SAM from death pool | Known | Prev cat 1; from GBD |
|  | Death pool adjusted TMREL prevalence | Known | Prev cat 4 / (1 + rate\_to\_prob(acmr)) |
|  | Death pool adjusted mild prevalence | Known | Prev cat 3 / (1 + rate\_to\_prob(acmr)) |
|  | Death pool adjusted MAM prevalence | Known | Prev cat 2 / (1 + rate\_to\_prob(acmr)) |
|  | Death pool adjusted SAM prevalence | Known | Prev cat 1 / (1 + rate\_to\_prob(acmr)) |
|  | Death pool prevalence | Known | rate\_to\_prob(acmr) / (1 + rate\_to\_prob(acmr)) |
|  | Coverage of SAM | Known | Defined on wasting treatment intervention model document |
|  | Efficacy of SAM | Known | Defined on wasting treatment intervention model document |
|  | Coverage of MAM treatment | Known | Defined on wasting treatment intervention model document |
|  | Efficacy of MAM treatment | Known | Defined on wasting treatment intervention model document |
|  | Annual recovery rate to mild for effectively treated SAM | Known | Defined on wasting treatment intervention model document |
|  | **Annual recovery rate of untreated SAM** | **Unknown** | **Prob\_to\_rate(r2)** |
|  | Annual recovery rate of treated MAM | Known | Defined on wasting treatment intervention model document |
|  | **Annual recovery rate of untreated MAM** | **Unknown** | **Solved below** |

**EQUATIONS USED TO SOLVE FOR UNKOWNS:**

These equations are true under the assumption of a steady state equilibrium. Under these conditions, the rate of flow out of a given state in the system must equal the rate of flow into that state. Equations 1 through 4 represent these steady state flow equations. Equation 5 is the decomposition of the recovery probability from MAM to mild into the untreated and treated recovery rates (based on what we know about the treated recovery rate).

|  |  |
| --- | --- |
| Eq1 (cat4 steady state) |  |
| Eq2 (cat3 steady state) |  |
| Eq3 (cat2 steady state) |  |
| Eq4 (cat1 steady state) |  |
| Eq5 (mam recovery stratification into treated and untreated) |  |

**VALUES FOR UNKNOWNS:**