A diagram of a diagram

Description automatically generated

**Table: Vensim Stocks and Flows**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Component** | **Description** | **Type** | **Formula** | **Initial conditions and units** |
| Susceptible | The number of individuals who have never been infected with TB | Stock |  | **IC:** 3.8e+07-*initial incident*-*initial latent*  **Units**: People |
| Latent TB infection | Individuals infected with TB, but are not infectious or symptomatic | Stock |  | **IC:** *Initial Latent*  **Units:** People |
| Active | Individuals with TB disease who are symptomatic and infectious | Stock |  | **IC:** *Initial Incident*  **Units:** People |
| Detected and Treated TB | Individuals who have been diagnosed and treated for TB | Stock |  | **IC:** 55000  **Units:** People |
| TB deaths | Number of individuals who have died from TB disease | Stock |  | **IC:** 0  **Units**: People |
| Total Pop | Total number of living individuals | Auxiliary |  | **Units:** People |
| Births | Number of births each month | Flow |  | **Units:** People/Month |
| Infection | Number of susceptible individuals infected with TB each month | Flow |  | **Units:** People/Month |
| Progression | Number of individuals infected with TB who progress to active TB each month | Flow |  | **Units:** People/Month |
| Detection | Number of individuals diagnosed and treated for TB each month | Flow |  | People/Month |
| Relapse | Number of previously diagnosed individuals who acquire active TB again per month | Flow |  | People/Month |
| Deaths TB | Number of individuals with active TB who die as a result of TB per month | Flow |  | People/Month |
| Deaths S | General deaths in the susceptible population per month | Flow |  | People/Month |
| Deaths L | General deaths in the latently infected population per month | Flow |  | People/Month |
| Deaths A | General deaths in the active TB population per month | Flow |  | People/Month |
| Deaths T | General deaths in the diagnosed and treated population per month | Flow |  | People/Month |

**Table: Model Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Component** | **Description** | **Value/Equation** | **Units** | **Source** |
| Birth rate | The monthly birth rate per individual | 0.028/12 | 1/Month | [1]  Yearly crude birth rate per 1000 people in 2021 divided by 12 to acquire a monthly rate |
| General mortality | The monthly crude death rate per individual | 0.008/12 | 1/Month | [2]  Yearly crude death rate per 1000 people in 2021 divided by 12 to acquire a monthly rate |
| CFR |  | 0.089/12 | 1/Month | [3]  Per capita mortality hazard of those with TB disease per year, divide by 12 for monthly rate |
| Transmission Rate | Rate at which a susceptible individual may interact with and be infected by an individual with TB | 0.06356 | 1/Month | Calibrated |
| Progression Time |  |  |  |  |
| Progression Rate | The rate at which an individual with latent TB moves to having active TB | 0.09566 | 1/Month | Calibrated |
| Diagnosis and treatment delay |  |  |  | [4]  Estimated to be equal to duration of DS-TB treatment |
| CDR |  |  | 1/Month |  |
| Relapse rate | Rate at which a person who has previously been treated with TB experiences diseases reactivation | 0.0083138 | 1/Month | Calibrated |
| Initial Latent | The starting number of individuals with latent TB in the model | 1 732 038 | People | Calibrated |
| Initial Incident | The starting number of individuals with active TB in the model | 1 903 068 | People | Calibrated |

References

[1] The World Bank, “Birth rate, crude (per 1,000 people) - Kenya | Data.” Accessed: Mar. 25, 2024. [Online]. Available: https://data.worldbank.org/indicator/SP.DYN.CBRT.IN?end=2021&locations=KE&start=2000&view=chart

[2] The World Bank, “Death rate, crude (per 1,000 people) - Kenya | Data.” Accessed: Mar. 25, 2024. [Online]. Available: https://data.worldbank.org/indicator/SP.DYN.CDRT.IN?end=2021&locations=KE&start=2000&view=chart

[3] N. Arinaminpathy *et al.*, “Modelling the impact of effective private provider engagement on tuberculosis control in urban India - Supplementary Material,” *Sci Rep*, vol. 9, no. 1, p. 3810, 2019, doi: 10.1038/s41598-019-39799-7.

[4] South African National Department of Health, “CLINICAL MANAGEMENT OF RIFAMPICIN-RESISTANT TUBERCULOSIS: Updated Clinical Reference Guide,” Jul. 2023.