

A Compartmental Model for SARS-CoV-2

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Data and model (simplified) based on [1].

Parameters

Parameter	Description	Reference Value
R_0	Basic reproduction number	2(RKI, optimistic), 3-4
T_i	Average infectious period	9-10 days
T_{inc}	Average incubation period	2 days
T_{rm}	Recovery period (mild cases)	9 days
T_{rs}	Recovery period (severe cases)	14 days
T_h	Hospitalization lag	3-4 days
T_d	Death lag	10 days
p_m	Mild probability	95.54%
p_s	Severe probability	3.9%
p_f	Fatal probability (CFR)	0.56%

ODE Model

$$\frac{d}{dt} \begin{bmatrix} S \\ E \\ I \\ M \\ \Sigma \\ H \\ F \\ R \\ D \end{bmatrix} = \begin{bmatrix} -IR_0T_i^{-1} & & & & & & & & \\ IR_0T_i^{-1} & -T_{inc}^{-1} & & & & & & & \\ & T_{inc}^{-1} & -T_i^{-1} & & & & & & \\ & & p_mT_{inc}^{-1} & -T_{rm}^{-1} & & & & & \\ & & & & & & & & \\ & & p_sT_{inc}^{-1} & & -T_h^{-1} & & & & \\ & & & & T_h^{-1} & -T_{rs}^{-1} & & & \\ & & p_fT_{inc}^{-1} & & & -T_d^{-1} & & & \\ & & T_{rm}^{-1} & & & & T_{rh}^{-1} & & \end{bmatrix} T_d^{-1} \begin{bmatrix} S \\ E \\ I \\ M \\ \Sigma \\ H \\ F \\ R \\ D \end{bmatrix} \quad (1)$$

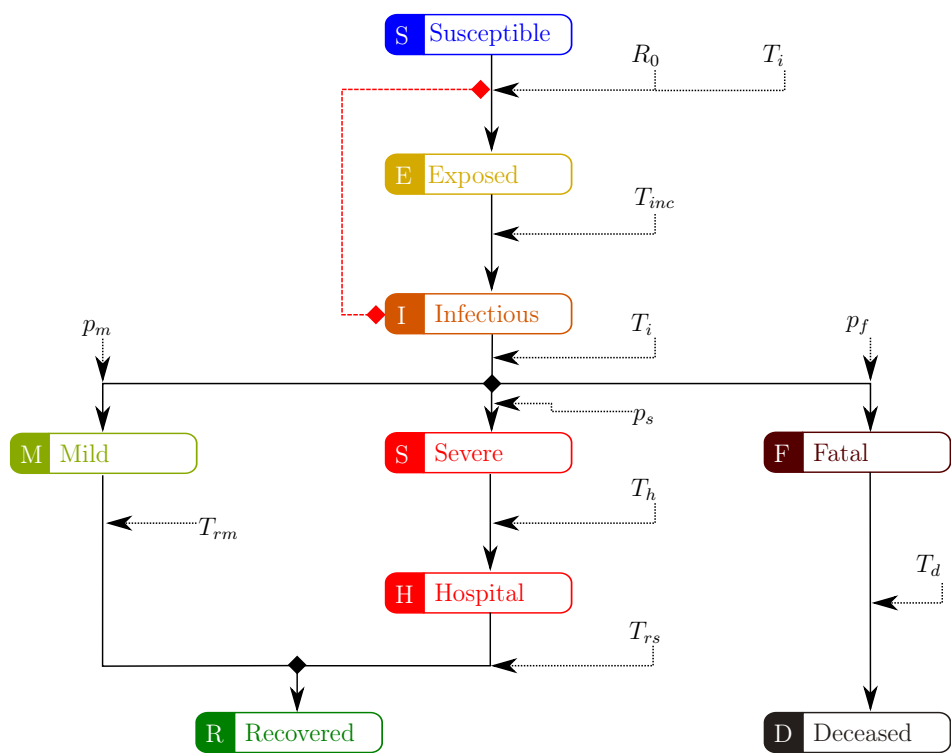


Figure 1: SEIR model with

References

- [1] M. an der Heiden. "Beispielszenarien der SARS-CoV-2-Epidemie 2020 in Deutschland." In: (Mar. 20, 2020). DOI: 10.25646/6571.2. URL: https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Modellierung_Deutschland.pdf?__blob=publicationFile (visited on 03/31/2020).