Generalized S-I-R model

1 Equations

These are the equations for the model:

$$\frac{dE_1}{dt} = \Theta_1 E_1 + \mu_1 R_1 + \Lambda_1 R_1 + \delta_1 - \Lambda_1 R_1 - \delta_1$$

$$\frac{dE_2}{dt} = \Theta_2 E_2 + \mu_2 R_2 + \Lambda_2 R_2 + \delta_2 - \Lambda_2 R_2 - \delta_2$$

$$\frac{dE_3}{dt} = \Theta_3 E_3 + \mu_3 R_3 + \Lambda_3 R_3 + \delta_3 - \Lambda_3 R_3 - \delta_3$$

$$\frac{dI\_pre_1}{dt} = \Theta_1 I\_pre_1 + \mu_1 E_1 +$$

$$\frac{dI\_pre_2}{dt} = \Theta_2 I\_pre_2 + \mu_2 E_2 +$$

$$\frac{dI\_pre_3}{dt} = \Theta_3 I\_pre_3 + \mu_3 E_3 +$$

$$\frac{dI\_symp\_s_1}{dt} = \Theta_1 I\_symp\_s_1 + \mu_1 I\_pre_1 +$$

$$\frac{dI\_symp\_s_2}{dt} = \Theta_2 I\_symp\_s_2 + \mu_2 I\_pre_2 +$$

$$\frac{dI\_symp\_s_3}{dt} = \Theta_3 I\_symp\_s_3 + \mu_3 I\_pre_3 +$$

$$\frac{dI\_symp\_m_1}{dt} = \Theta_1 I\_symp\_m_1 + \mu_1 I\_pre_1 +$$

$$\frac{dI\_symp\_m_2}{dt} = \Theta_2 I\_symp\_m_2 + \mu_2 I\_pre_2 +$$

$$\frac{dI\_symp\_m_3}{dt} = \Theta_3 I\_symp\_m_3 + \mu_3 I\_pre_3 +$$

$$\frac{dI\_asymp_1}{dt} = \Theta_1 I\_asymp_1 + \mu_1 I\_pre_1 +$$

$$\frac{dI\_asymp_2}{dt} = \Theta_2 I\_asymp_2 + \mu_2 I\_pre_2 +$$

$$\frac{dI\_asymp_3}{dt} = \Theta_3 I\_asymp_3 + \mu_3 I\_pre_3 +$$

$$\frac{dHOSP\_m_1}{dt} = \Theta_1 HOSP\_m_1 + \mu_1 I\_symp\_m_1 +$$

$$\frac{dHOSP\_m_2}{dt} = \Theta_2 HOSP\_m_2 + \mu_2 I\_symp\_m_2 +$$

$$\frac{dHOSP\_m_3}{dt} = \Theta_3 HOSP\_m_3 + \mu_3 I\_symp\_m_3 +$$

$$\frac{dHOSP\_s_1}{dt} = \Theta_1 HOSP\_s_1 + \mu_1 I\_symp\_s_1 +$$

$$\frac{dHOSP\_s_2}{dt} = \Theta_2 HOSP\_s_2 + \mu_2 I\_symp\_s_2 +$$

$$\frac{dHOSP\_s_3}{dt} = \Theta_3 HOSP\_s_3 + \mu_3 I\_symp\_s_3 +$$

$$\frac{dR_1}{dt} = \Theta_1 R_1 + \mu_1 I\_symp\_s_1 + \mu_1 I\_symp\_m_1 + \mu_1 I\_asymp_1 + \mu_1 HOSP\_m_1 + \mu_1 HOSP\_s_1 +$$

$$\frac{dR_2}{dt} = \Theta_2 R_2 + \mu_2 I\_symp\_s_2 + \mu_2 I\_symp\_m_2 + \mu_2 I\_asymp_2 + \mu_2 HOSP\_m_2 + \mu_2 HOSP\_s_2 +$$

$$\frac{dR_3}{dt} = \Theta_3 R_3 + \mu_3 I\_symp\_s_3 + \mu_3 I\_symp\_m_3 + \mu_3 I\_asymp_3 + \mu_3 HOSP\_m_3 + \mu_3 HOSP\_s_3 +$$

$$\frac{dS}{dt} = \frac{R_1}{N}\delta_1 \frac{R_2}{N}\delta_2 \frac{R_3}{N}\delta_3 - \frac{E_1}{N}\delta_1 - \frac{E_2}{N}\delta_2 - \frac{E_3}{N}\delta_3$$