Example

Transmissions of bacterial infections in daycare centers.

- Cross-sectional data from a stochastic SIS-model
- Continuous-time Markov process with transition probabilities:

$$P(I_{is}(t+dt)=1\,|\,I_{is}(t)=0)=\theta_1\cdot E_s(I(t))+\theta_2\cdot P_s, \quad \text{if} \quad I_{i1}(t)+\cdots+I_{iN_s}(t)=0$$
$$P(I_{is}(t+dt)=1\,|\,I_{is}(t)=0)=\theta_3\cdot(\theta_1\cdot E_s(I(t))+\theta_2\cdot P_s), \quad \text{otherwise}$$
$$P(I_{is}(t+dt)=0\,|\,I_{is}(t)=1)=\gamma$$

- $I_{is}(t)$ is the status of carriage of strain s for individual i.
- $E_s(I(t))$ is the probability of sampling the strain s
- θ_1 is the rate of transmission from other children at the DCC
- θ_2 is the rate of transmission from the community outside the DCC
- θ_3 scales the rate of an infected child being infected with another strain
- γ is the relative probability of healing from a strain (scaled to 1)

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$$P(I_{is}(t+dt)=1\,|\,I_{is}(t)=0)=\theta_1\cdot E_s(I(t))+\theta_2\cdot P_s,\quad \text{if}\quad I_{i1}(t)+\cdots+I_{iN_s}(t)=0$$

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$$P(I_{is}(t+dt)=0\,|\,I_{is}(t)=1)=\gamma$$