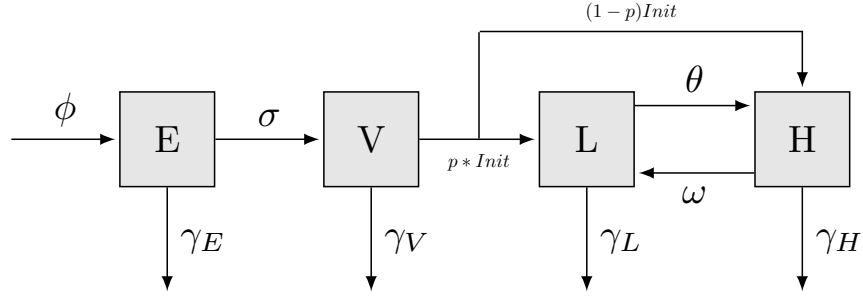


Four State Model (EVLH)

Charles Marks



$$\frac{dE}{dt} = \phi - \sigma - \gamma_E E$$

$$\frac{dV}{dt} = \sigma - \underbrace{c\beta V \left(\frac{L + \eta H}{L + H + V + E} \right)}_{\text{initiation}} - \underbrace{\gamma_V V}_{\text{death}}$$

$$\frac{dL}{dt} = \underbrace{pc\beta V \left(\frac{L + \eta H}{L + H + V + E} \right)}_{\text{initiation}} - \theta + \omega - \gamma_L L$$

$$\frac{dH}{dt} = \underbrace{(1-p)c\beta V \left(\frac{L + \eta H}{L + H + V + E} \right)}_{\text{initiation}} + \theta - \omega - \gamma_H H$$

Symbol	Parameter Description	Units
E	Everybody (Full Population for Give Environment)	Persons
V	Vulnerable Population	Persons
L	Low-Rate Initiator Population	Persons
H	High-Rate Initiator Population	Persons
ϕ	births, inflow to E	Persons
σ	function representing transitions from E to V	Persons
c	contacts per time unit	Persons
β	infection rate	$\in [0, 1]$
η	high-initiator effect	$\in [0, \infty)$
p	Initiation Into L or H Probability	$\in [0, 1]$
θ	L to H transition function	Persons
ω	H to L transition function	Persons
γ_E	Death Rate of E	$\in [0, 1]$
γ_V	Death Rate of V	$\in [0, 1]$
γ_L	Death Rate of L	$\in [0, 1]$
γ_H	Death Rate of H	$\in [0, 1]$