**Differential equations**

The force of infection is given by:

*λ* = *β*A.IA + *β*L.IL.+ *β*M.IM + *β*H.IH

The differential equations that require solving are:

dSA/dt = −*λ*.SA

dSL/dt = −*λ*.SL

dSM/dt = −*λ*.SM

dSH/dt = −*λ*.SH

dIA/dt = *λ*.SA − *γ*A.IA

dIL/dt = *λ*.SL − *γ*L.IL

dIM/dt = *λ*.SM − *γ*M.IM

dIH/dt = *λ*.SH − *γ*H.IH

dRA/dt = *γ*A.IA

dRL/dt = *γ*L.IL

dRM/dt = *γ*M.IM

dRH/dt = *γ*H.IH

subject to the initial conditions SA(0) = 0.35 − IA(0), SH(0) = 0.0025, SL(0) = (1 − (SA + SH)).(1 − *q*), SM(0) = (1 − (SA + SH)).(*q*), IA(0) = 0.001, and IL(0) = IM(0) = IH(0) = RA = RL(0) = RM(0) = RH(0) = 0.