

S8 Text. Calculation of R_0

The R_0 of the two-compartment Ross-Macdonald model for dengue fever presented in Equations 13-14 in the main text can be determined as the determinant of the Jacobian matrix of the linearised system. From Equations 13-14, we can write the Jacobian as

$$R_0 = Det \begin{bmatrix} \frac{\partial H}{\partial V} & \frac{\partial H}{\partial V} \\ \frac{\partial V}{\partial H} & \frac{\partial V}{\partial V} \end{bmatrix} \quad (\text{Equation A})$$

Then, calculating the partial derivatives:

$$R_0 = Det \begin{bmatrix} aBV(t) \frac{A^*}{2N^*} - r & aB \frac{A^*}{2N^*} (1 - H(t)) \\ aC(1 - V(t)) & aCH(t) - \mu_A^* \end{bmatrix} \quad (\text{Equation B})$$

Assuming that dengue invades an entirely healthy population, $H(t) \rightarrow 0$ and $V(t) \rightarrow 0$. The adult *Ae. aegypti* population, $A(t)$, human population, $N(t)$, and adult *Ae. aegypti* mortality, $\mu_A(t)$, are assumed to be at equilibrium ($A(t) = A^*$, $N(t) = N^*$ and $\mu_A(t) = \mu_A^*$). Therefore R_0 is described by

$$R_0 = Det \begin{bmatrix} -r & \frac{aBA^*}{2N^*} \\ aC & -\mu_A^* \end{bmatrix} \quad (\text{Equation C})$$