**Text S1. Prior and hyperprior distribution specification**

Model parameters were estimated in a Bayesian framework, using Integrated Nested Laplace Approximation (INLA, [www.r-inla.org](http://www.r-inla.org)) in R version 3.4.2. Parameter uncertainty is accounted for by assigning prior distributions to the parameters. Autocorrelated random effects for each month of the dengue year (from June to May) were included to account for the annual cycle of dengue. The month effect βt'(t) was assigned a random walk or first difference prior distribution, in which each effect is derived from the immediately preceding effect, βt'(t) - βt'(t)−1 ∼ N(0, σ2β), t’(t) = 1, . . . , 12 where β1 represents the parameter estimate for the month of June. For model fitting purposes, independent and exchangeable random effects γT'(t) , T’(t)=1,…,17 were included for each ‘dengue’ year (from June to May) using a Gaussian distribution with zero mean and large variance for the unstructured prior γT'(t) ∼ N (0, σ2γ) (Note, for out-of-sample predictions the year indicator was set to null for the year we were trying to predict). For both random effect terms, we assigned the R-INLA default hyperparameter to the precision (τ = 1/σ2), that is τ ~Gamma(a, b) with shape parameter a = 1 and inverse-scale parameter b =1⋅10-5.