**Text S2:** **Priors**

We found that weakly informative priors improved the sampling process substantially. Most of what we know about the EIP is based on the data used here, so we based the priors on information known before these observations. The earliest report we found speculating explicitly about the EIP, was that of Bancroft ([1](#_ENREF_1)906) who proposed a period of approximately 12 days as had been estimated for yellow fever virus. We set the prior standard deviation for the EIP at half of that, i.e. 6 days. It was also clear early on that once exposed to mosquitoes, humans could become sick with dengue within 4-6 days (Graham 1903). We therefore set the IIP prior to 5 days with a standard deviation of 2.5 days. The mean and variance of each incubation period where then used to calculate the corresponding means for the priors of β0, shape, and precision. The standard deviation of each of these priors was set to one third of the respective prior mean, indicating that the value is expected to be greater than zero and not many times greater than the prior mean.

For βT, we used a prior mean of zero. We further expect that any effect will be on a scale of less than one tenth of β0 per degree of temperature change, so we set the βT prior standard deviation to one third of that value. The mean of the random study effects is zero and its variance should also be limited relative to β0. The mean of its prior precision, τS, was therefore set to be equivalent to a standard deviation of one tenth of the β0 prior mean; and the τS prior standard deviation was set to one third of that value. For each serotype dummy variable, the corresponding β prior mean was similarly set to 0 with a prior standard deviation of one tenth of the β0 mean.