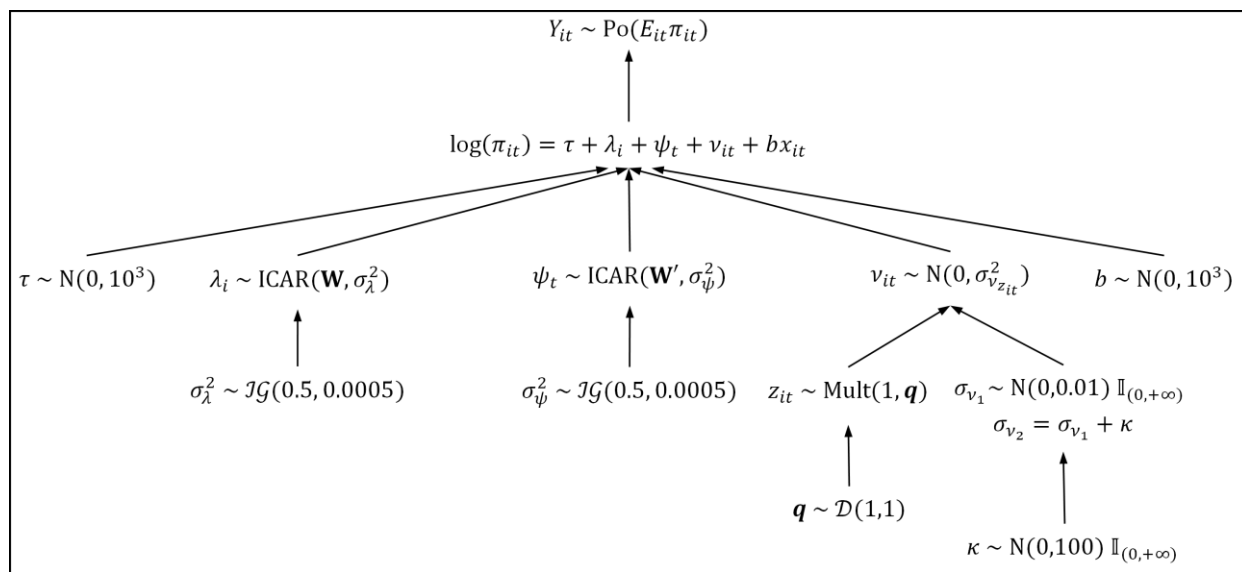


**Supplementary Figure 1:** Schematic diagram of the BaySTDetect model after modifications to the original model.  $\mathbf{W}$  and  $\mathbf{W}'$  denote the spatial and temporal adjacency matrices respectively, and  $\eta_i \sim \text{ICAR}(\mathbf{W}, \sigma_\eta^2)$ ,  $\gamma_t \sim \text{ICAR}(\mathbf{W}', \sigma_\gamma^2)$ , and  $\xi_{it} \sim \text{ICAR}(\mathbf{W}', \sigma_{\xi,i}^2)$  are shorthand notation for Equations (4), (5) and (6) respectively.



**Supplementary Figure 2:** Schematic diagram of the space-time mixture model after modifications to the original model. and  $\mathbf{W}$  and  $\mathbf{W}'$  denote the spatial and temporal adjacency matrices respectively,  $\lambda_i \sim \text{ICAR}(\mathbf{W}, \sigma_\lambda^2)$  and  $\psi_t \sim \text{ICAR}(\mathbf{W}', \sigma_\psi^2)$  are shorthand notation for Equation (8) and (9) respectively, and  $\mathcal{IG}(\cdot)$  denotes the inverse gamma distribution.