

```

model{
  for(i in 1:n){
    for(t in 1:T){
      O[t,i]~dpois(eta[t,i])
      log(eta[t,i]) <- log(E[t,i]) + beta[1]*X1[t,i] + beta[2]*X2[t,i] + beta[3]*X3[t,i] +
        mu + alpha[t] + theta.ST[t,i]
      R[i,t] <- 100*exp(beta[1]*X1[t,i] + beta[2]*X2[t,i] + beta[3]*X3[t,i] + mu +
        alpha[t] + theta.ST[t,i])
    }
  }
}

```

#Spatio-temporal effect for the first period

```

theta.S[1,1:n]~car.normal(adj[],weights[],num[],prec.phi)
for(i in 1:n){
  BYM[1,i]~dnorm(theta.S[1,i],prec.theta)
}
for(i in 1:n){theta.ST[1,i] <- pow(1-rho*rho,-0.5)*BYM[1,i]}

```

#Spatio-temporal effect for the subsequent periods

```

for(t in 2:T){
  for(i in 1:n){
    theta.ST[t,i] <- rho*theta.ST[t-1,i] + BYM[t,i]
    BYM[t,i]~dnorm(theta.S[t,i],prec.theta)
  }
  theta.S[t,1:n]~car.normal(adj[],weights[],num[],prec.phi)
}

```

#Prior distributions

```

mu~dnorm(0,0.01)
alpha[1:T]~car.normal(adj_temp[],weights_temp[],num_temp[],prec.alpha)
prec.phi <- pow(sigma.phi,-2)
sigma.phi ~ dunif(0,1)
prec.theta <- pow(sigma.theta,-2)
sigma.theta ~ dunif(0,1)
prec.alpha <- pow(sigma.alpha,-2)
sigma.alpha ~ dunif(0,1)
rho~dunif(-1,1)

for(i in 1:3){
  beta[i] ~ dnorm(0, 0.00001)
}
}

```