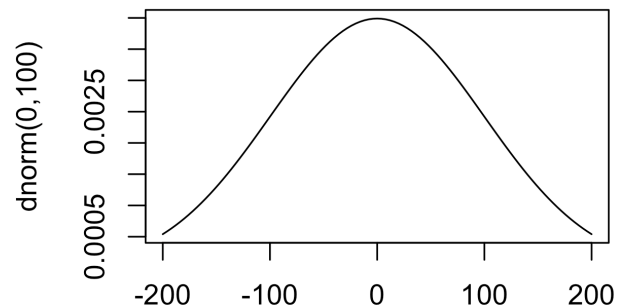**priors**
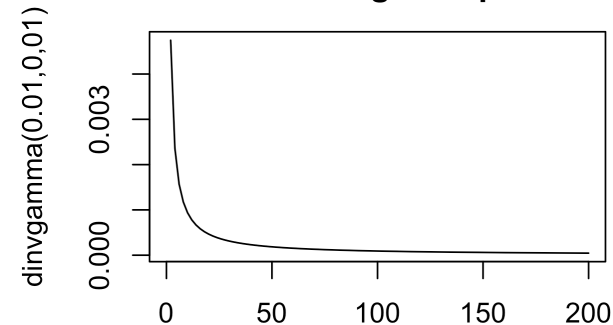
prior distribution of mean of beta0

prior distribution of variance sigma square
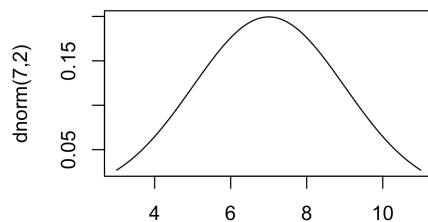
population level
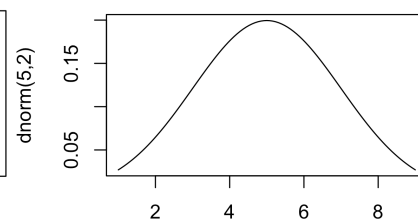
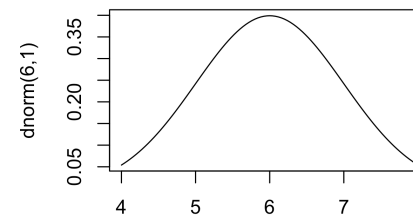**distribution of beta0**
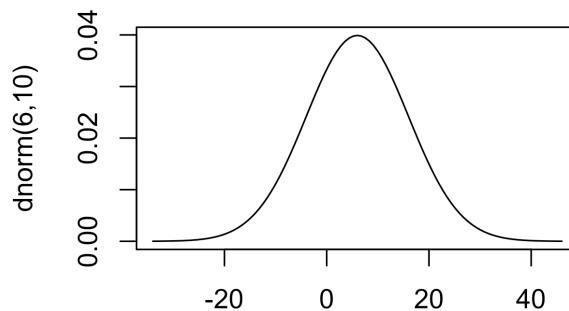
subject level posterior distributions
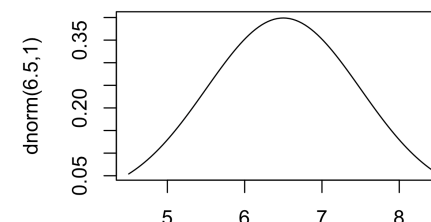
distribution of beta0_11

distribution of beta0_12

distribution of beta0_21

distribution of beta0_22

Respiratory hospitalizations

Cases of Disease

Time

Intercept

Trend

Influenza hospitalizations

RSV hospitalizations

Seasonal fluctuation

Random noise

Courtesy of Dan's lecture note

The model structure of our hierarchical Bayesian regression is given as:

$$Y_{ijk} \sim \text{Negative Binomial}(p_{ijk}, r), \quad p_{ijk} = \frac{r}{r + \lambda_{ijk}}$$

$$\lambda_{ijk} = \beta_{0jk} + \alpha_{1g(i)} + \alpha_{2m(i)} + \beta_{1jk}RSV_{ik} + \beta_{2g(i)jk}Flu_{ik}$$

Intercept

yearly variations

monthly variations

group-specific effect of RSV

RSV hospitalizations in children < 2 years old

group-specific effect of flu (varies by epidemiologic year)

Hyper-parameter (Group distribution)

Shrinkage

Individual groups

time i
age group j
SES group k