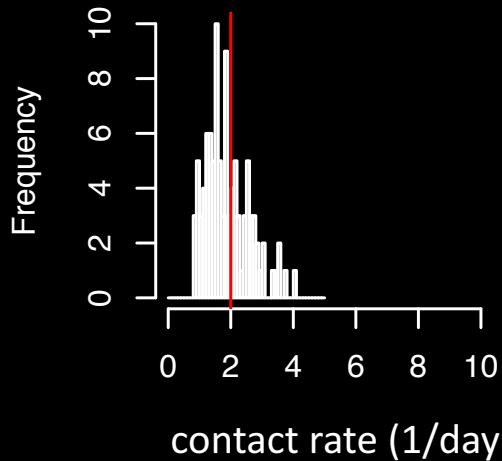


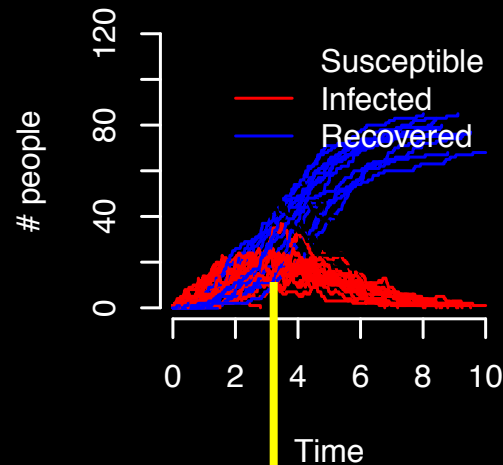
het.epidemic(beta.mean = 2, beta.var = .5, runs = 30, end.time = 10, pop.size = 100, gamma = 1)

het.epidemic(beta.mean = 2, beta.var = 8, runs = 30, end.time = 10, pop.size = 100, gamma = 1)

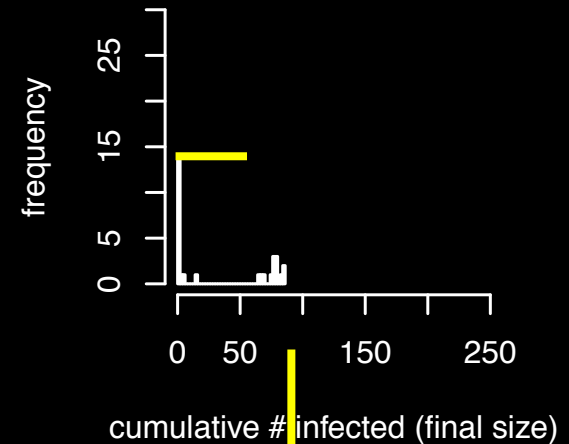
**distribution of average R**



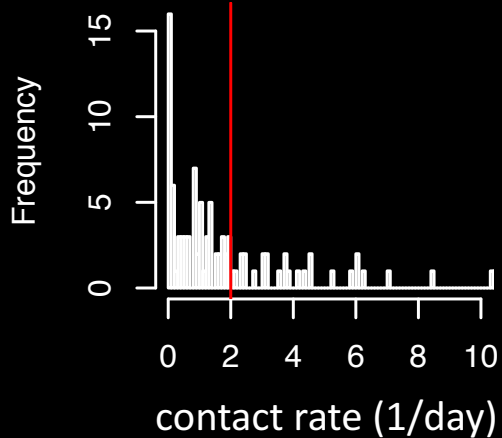
**time series**



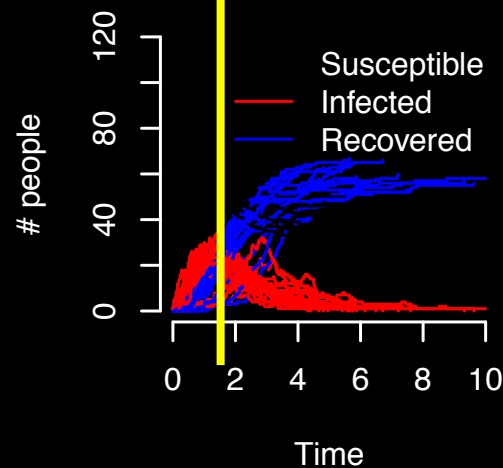
**outbreak size distribution**



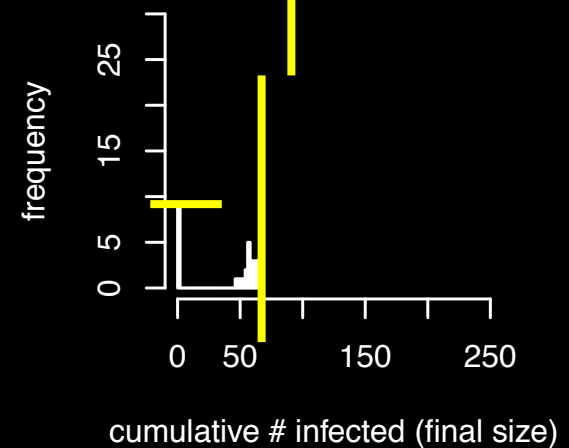
**distribution of average R**



**time series**



**outbreak size distribution**



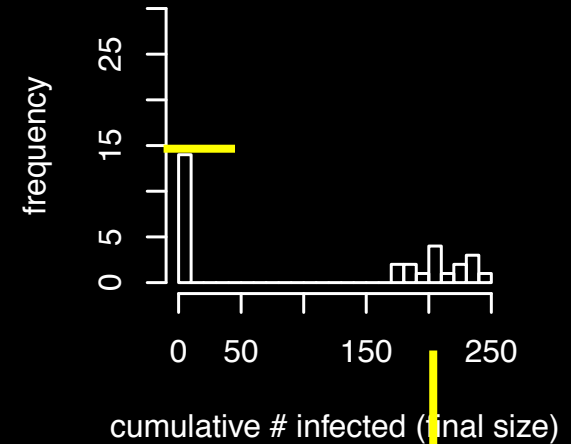
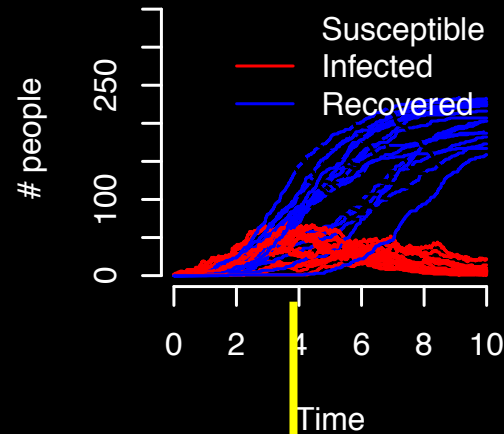
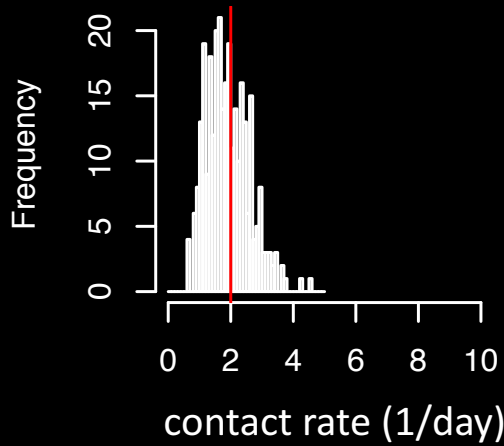
het.epidemic(beta.mean = 2, beta.var = .5, runs = 30, end.time = 10, pop.size = 300, gamma = 1)

het.epidemic(beta.mean = 2, beta.var = 8, runs = 30, end.time = 10, pop.size = 300, gamma = 1)

distribution of average R

time series

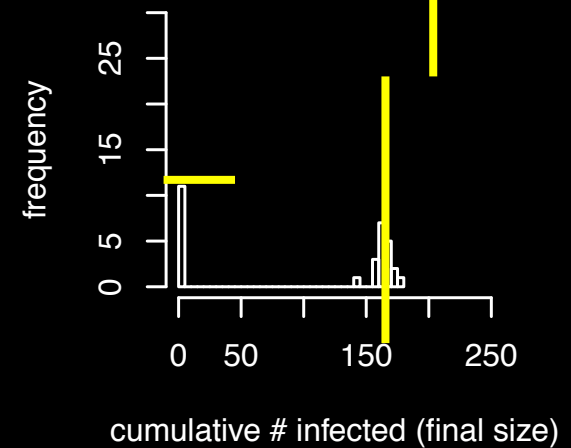
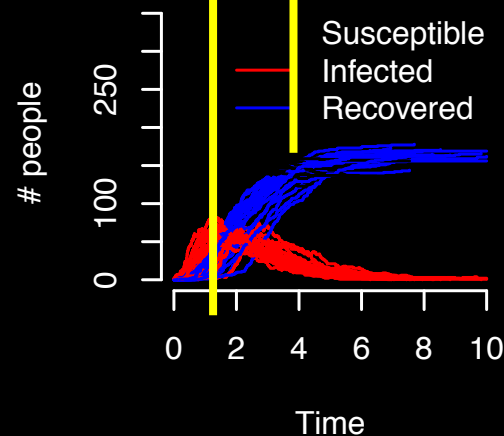
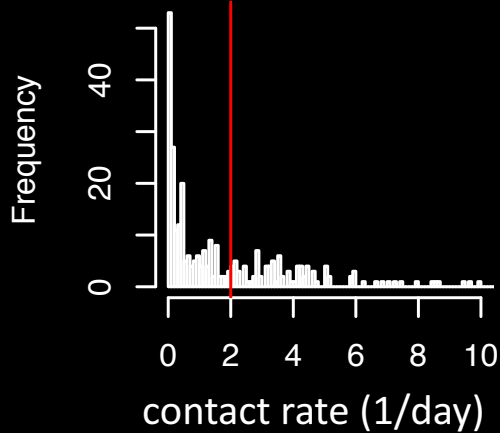
outbreak size distribution



distribution of average R

time series

outbreak size distribution



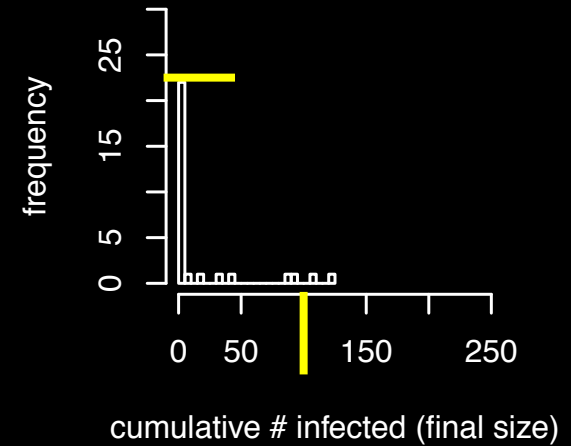
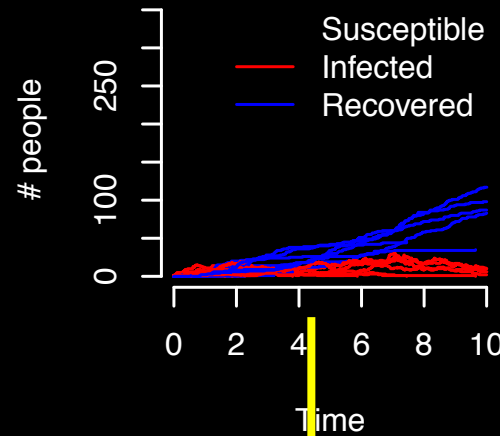
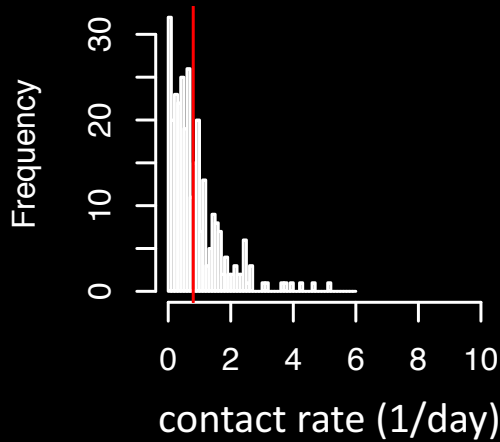
het.epidemic(beta.mean = .8, beta.var = .5, runs = 30, end.time = 10, pop.size = 300, gmma = 1)

het.epidemic(beta.mean = .8, beta.var = 8, runs = 30, end.time = 10, pop.size = 300, gmma = 1)

distribution of average R

time series

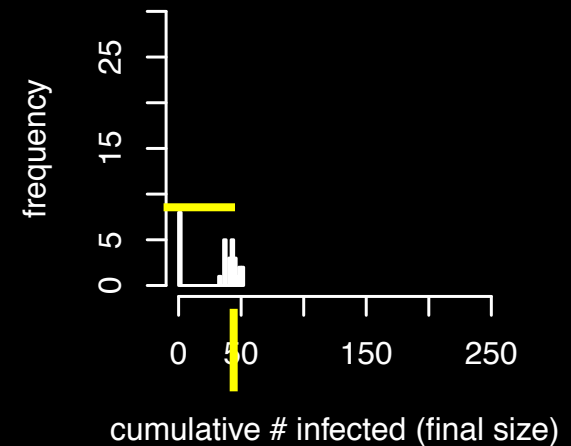
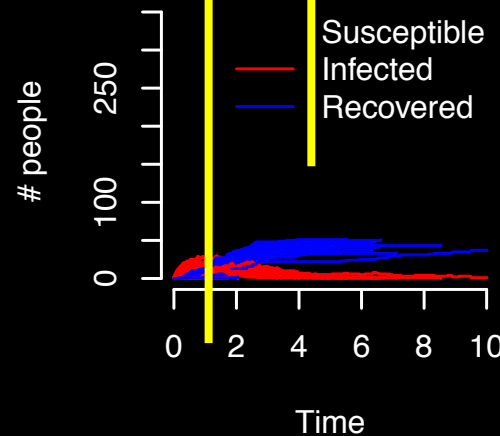
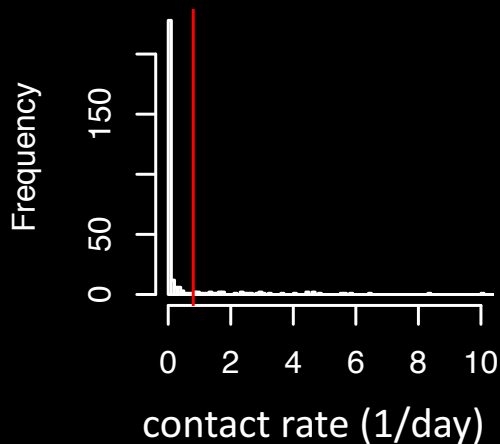
outbreak size distribution



distribution of average R

time series

outbreak size distribution



# Summary

- Heterogeneity makes pathogens
  - more likely to invade (higher  $R_0$ )
  - smaller epidemics for a given  $R_0$
  - faster epidemics
  - faster initial rate of increase