

Lab 2 Summary

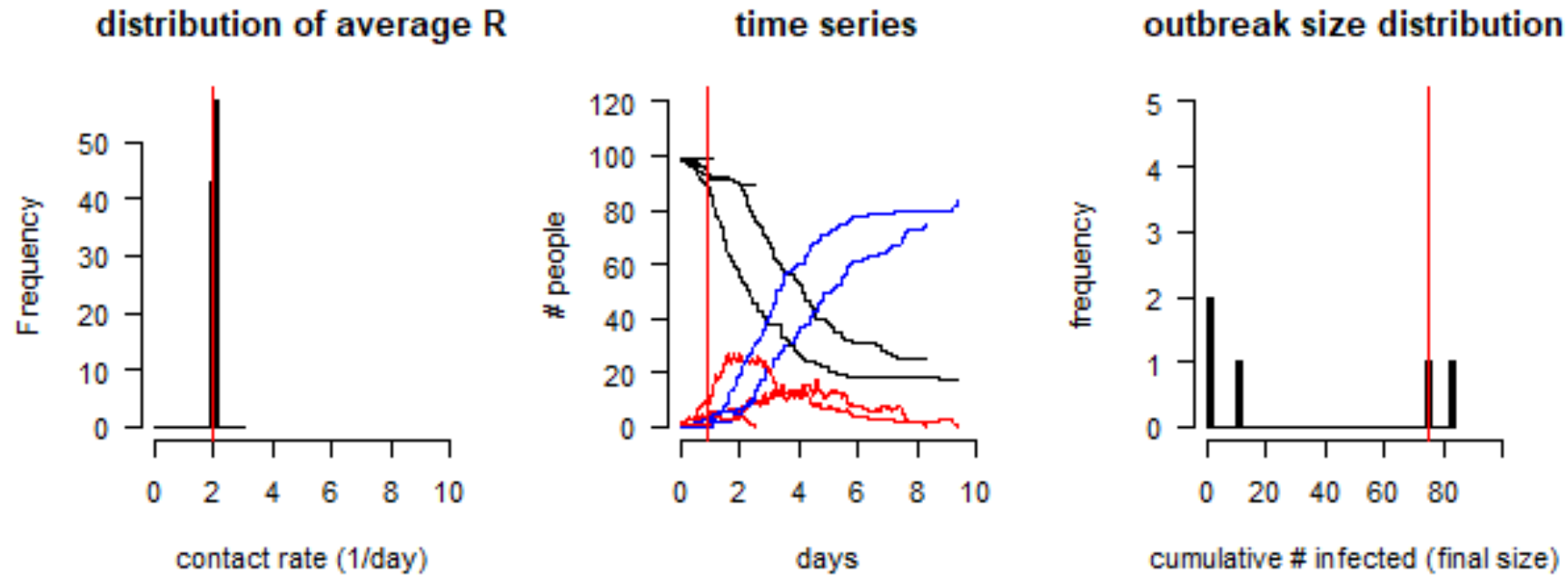
Consequences of Heterogeneity

Roger Ying
MMED 2018

Assumptions

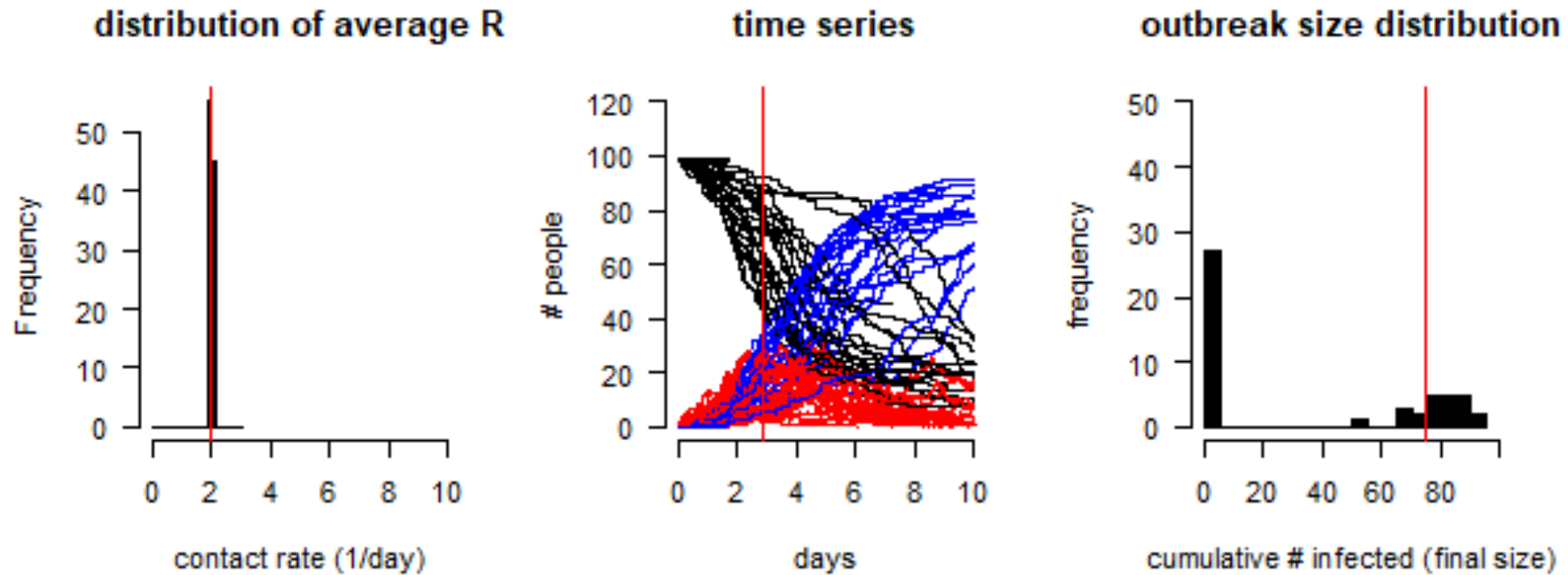
1. Everyone is the same except for their contact rates, which are gamma distributed
2. Disease transmission occurs one at a time (similar to event-driven model from yesterday)
3. Disease recovery rate is exponentially distributed

Step 1 – Low variance (homogeneous)



Beta.mean	2
Beta.var	0.001
Runs	5
Pop.size	100

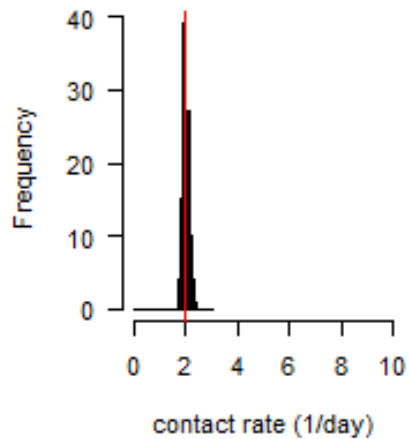
Step 2 – Increase number of runs



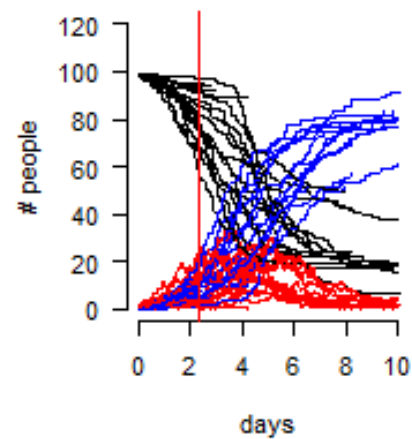
Beta.mean	2
Beta.var	0.001
Runs	50
Pop.size	100

Step 3 – Change variance

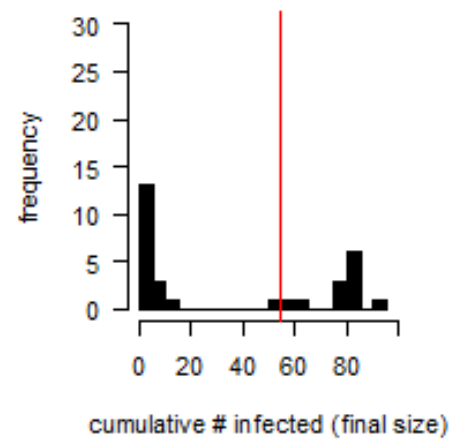
distribution of average R



time series

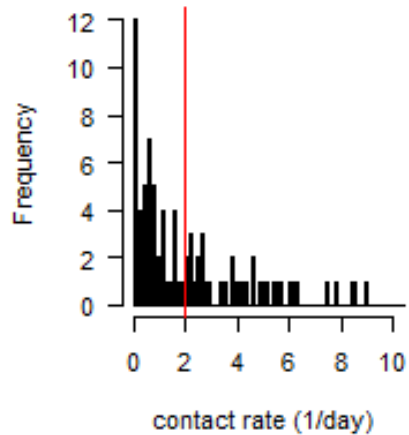


outbreak size distribution

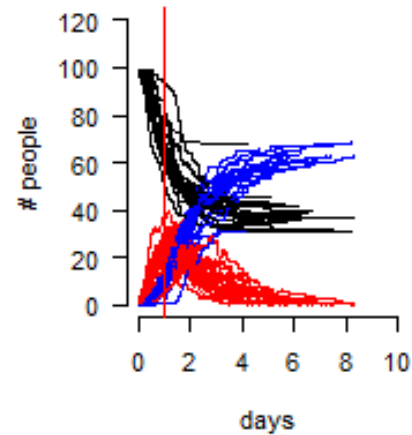


Beta.mean	2
Beta.var	0.01
Runs	30
Pop.size	100

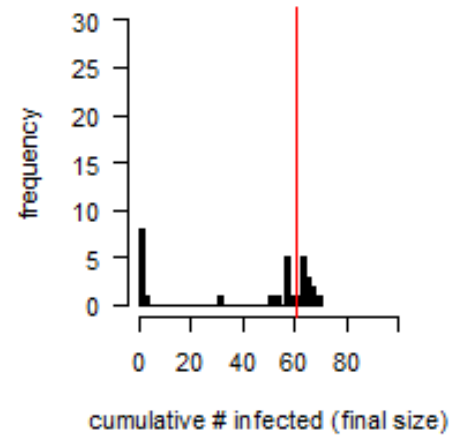
distribution of average R



time series



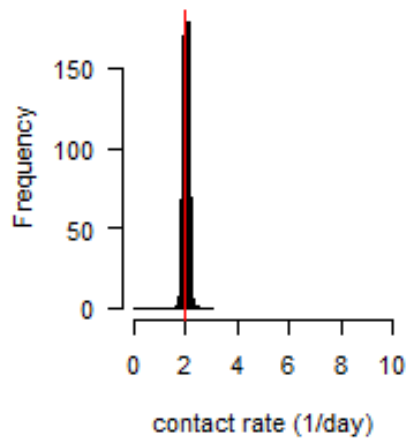
outbreak size distribution



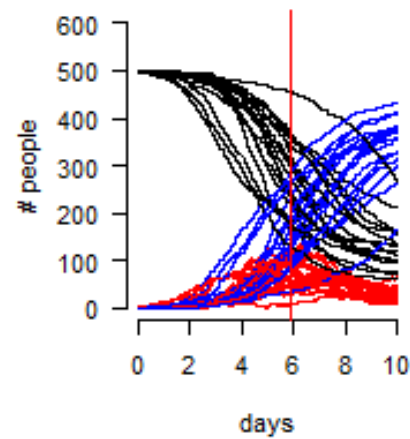
Beta.mean	2
Beta.var	5
Runs	30
Pop.size	100

Step 4 – Larger population size

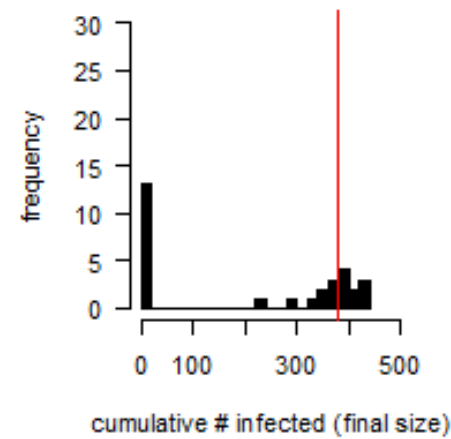
distribution of average R



time series

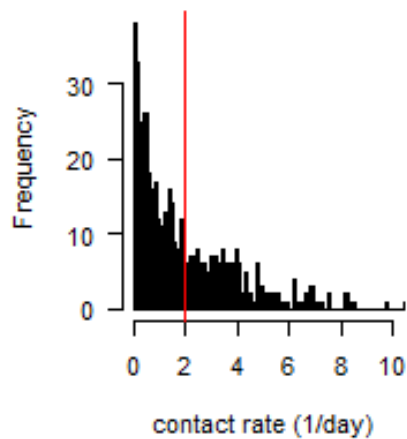


outbreak size distribution

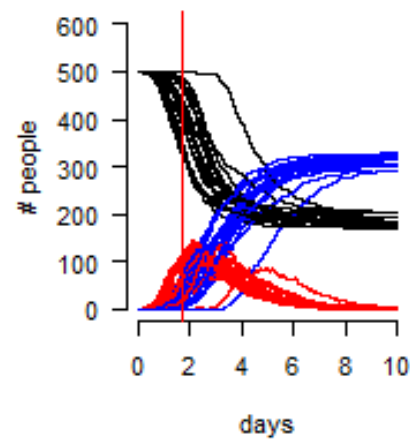


Beta.mean	2
Beta.var	0.01
Runs	30
Pop.size	500

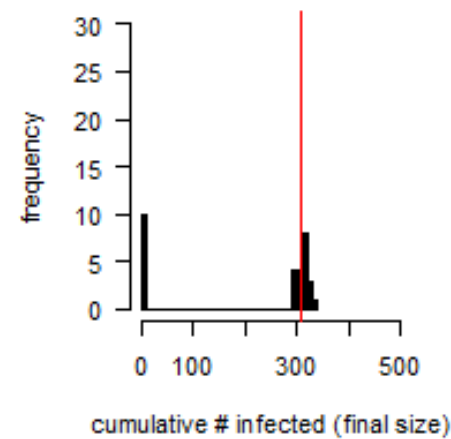
distribution of average R



time series



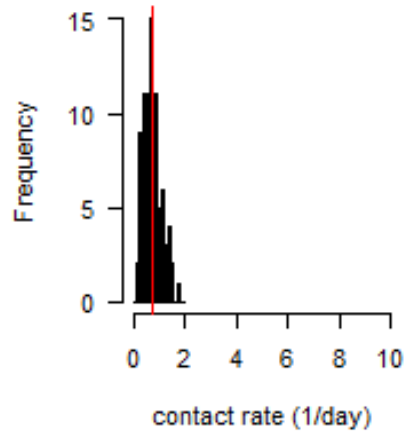
outbreak size distribution



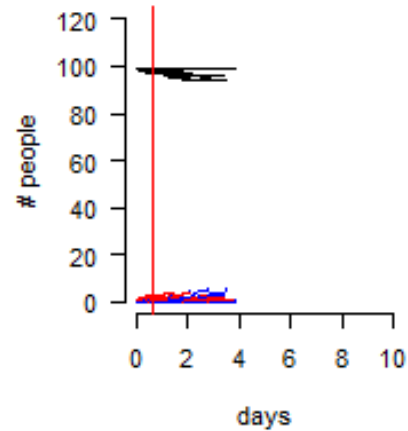
Beta.mean	2
Beta.var	5
Runs	30
Pop.size	500

Step 5 – Change mean beta \rightarrow 0.7

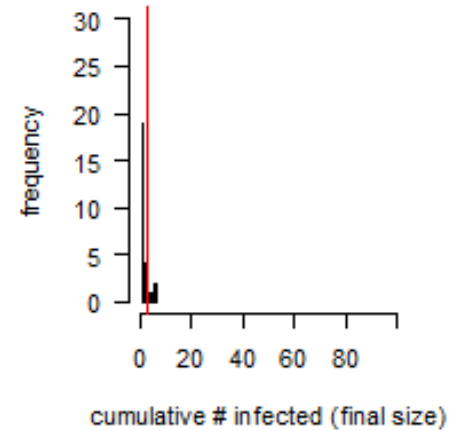
distribution of average R



time series

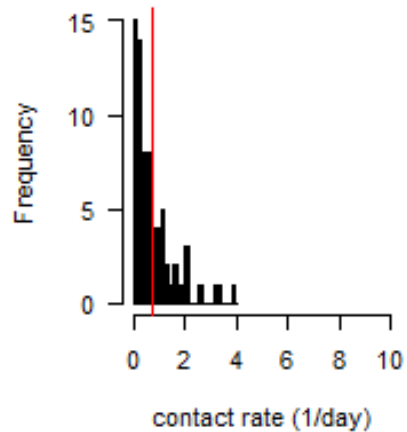


outbreak size distribution

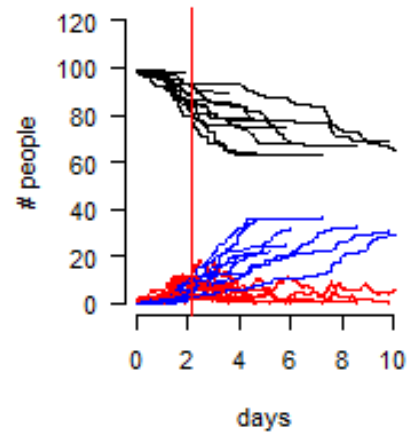


Beta.mean	0.7
Beta.var	0.1
Runs	30
Pop.size	100

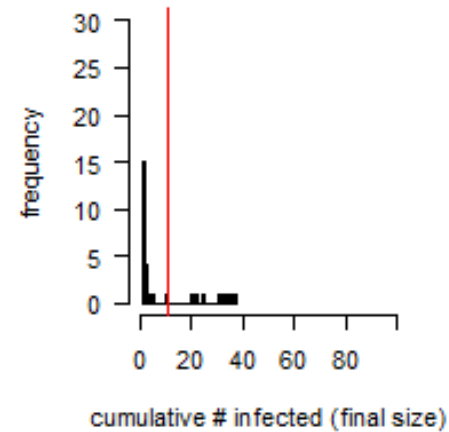
distribution of average R



time series



outbreak size distribution

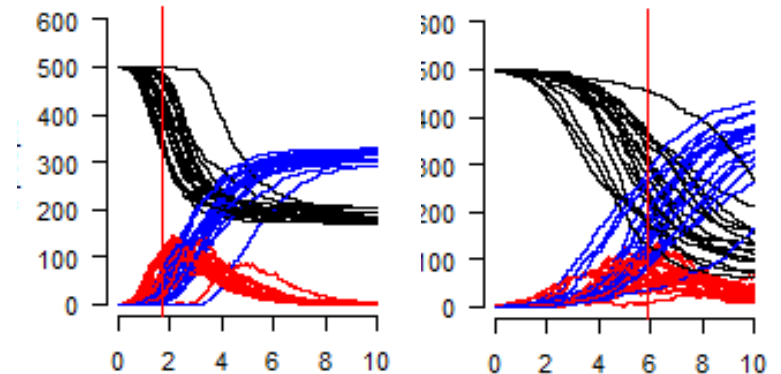


Beta.mean	0.7
Beta.var	10
Runs	30
Pop.size	100

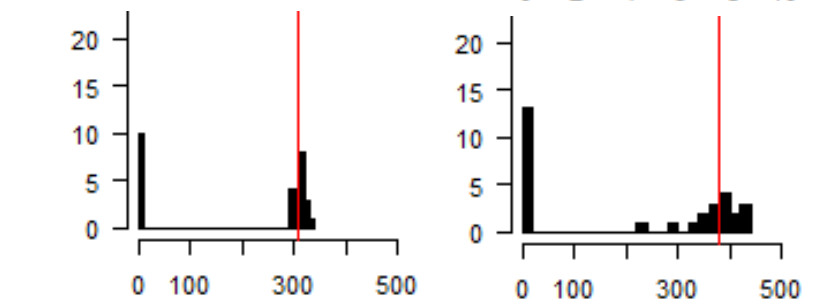
Summary

- Heterogeneous populations have:

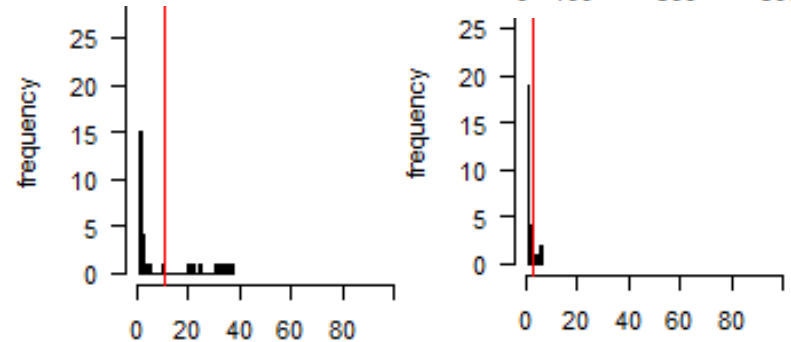
Earlier epidemics



Smaller epidemics

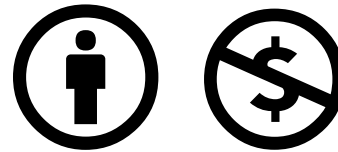


Higher probability of epidemic





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For further information please contact admin@ici3d.org.