

Biology 483- Infection, Immunity and Evolution of Disease
Spring 2022
Homework 14

Directions: Watch the following videos

<https://www.youtube.com/watch?v=SmhgeS-g90c>

What is the difference between a static and dynamic model?

Static models are like snapshots in which relationships do not change with respect to time, however, dynamic models are like movies in which time is a major factor in creating the outcomes.

➔ Mass and Weight (static) vs Motion (dynamic)

Are SIR models a type of compartment model? If so, what does that mean?

SIR model is a type of compartment model as each part of the SIR (Susceptible, Infectious, Recovered) represents a different group (or compartments) that a population falls into.

What are some pros (good things) about these kinds of models?

Compartment models are great in graphing change through time as individuals are easily quantifiable as they shift from one compartment to another. You can simply count the number of individuals within a compartment at a specific point in time to create an analytical summary of that time frame.

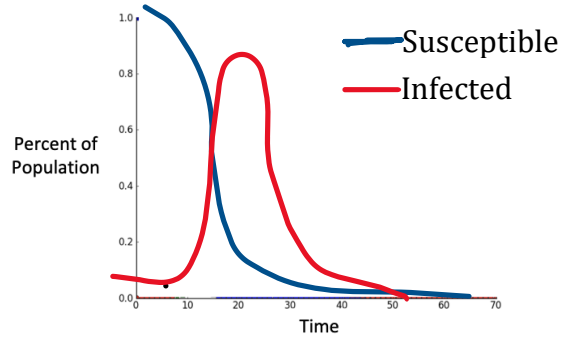
Susceptible ➔ Infectious ➔ Recovered

What are some cons (bad things... or limitations) about these kinds of models?

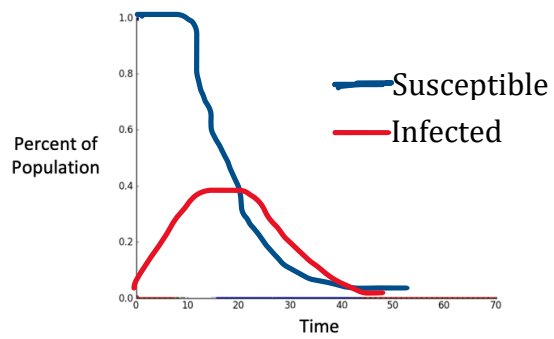
A limitation to these kinds of models is that you need to “keep it simple”. Each compartment can be subdivided into smaller compartments, but the mathematical computation gets more extensive until you reach the realm of individual based models.

➔ Complexity increases as more compartments are created

Imagine two SI models (note- this is not including “R” for recovered) one where 100% of the population is susceptible (no immunizations- on the left) and one where approximately 50% of a population is immunized to a pathogen. Draw how the lines for Susceptible and Infected trajectories look?



No immunizations



50% immunized

Curve is flattened when individuals are vaccinated

.